

Title: Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Electromagnetic Fields) Regulations 2016

IA No:

RPC Reference No: RPC-3185-DfT

Lead department or agency: Maritime and Coastguard Agency

Other departments or agencies: Department for Transport

Impact Assessment (IA)

Date: 09/08/2016

Stage: Final

Source of intervention: EU

Type of measure: Secondary legislation

Contact for enquiries:

Julie.Carlton@mcga.gov.uk, 020 3817 2498

Summary: Intervention and Options

RPC Opinion: EANDCB Validated

Cost of Preferred (or more likely) Option

Total Net Present Value	Business Net Present Value	Net cost to business per year (EANDCB in 2014 prices)	One-In, Three-Out	Business Impact Target Status
-£0.09m	-£0.03m	£0.00m	Not in scope	Non qualifying provision

What is the problem under consideration? Why is government intervention necessary?

Exposure to high levels of electro-magnetic fields (EMFs) can give rise to effects that may be irritating or unpleasant, or sometimes harmful and cause burns. The risks from EMFs in the UK are currently managed using the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997. While this legislative framework is generally deemed sufficient, the UK is required to give full effect to Directive 2013/35/EC by July 2016. UK implementation of the Directive through Regulations and guidance is needed to ensure seafarers remain protected and the burdens on businesses are minimised through practical assessment of exposure levels, proportionate risk management and exemptions.

What are the policy objectives and the intended effects?

The policy objectives for the Regulations are:

- (i) follow government policy and transpose the Directive in line with EU Treaty obligations;
- (ii) ensure seafarers remain protected from adverse health and safety risks;
- (iii) ensure control measures already in place are taken into account so any burdens on business are minimised.

The intended effect is to implement the Directive in a way that is proportionate to the risks and takes into account existing controls and therefore minimises the impact on businesses. It is also intended to ensure that implementation for seafarers is as far as appropriate consistent with that for shore-based workers.

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)

Against the "do nothing" option, only one option has been considered in this IA. Non-regulatory approaches would not fulfil the UK's obligations under EU Law. Our preferred legislative option (Option 2) is to introduce a new set of health and safety regulations that transpose those parts of the Directive not already covered by existing legislation: 'The Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Electromagnetic Fields) Regulations 2016'. It is not proposed to use pure 'copy out' as the topic is complex, the Directive is difficult to follow and it could lead dutyholders to believe they have to do more than is necessary to achieve compliance. The Regulations reproduce only those provisions of the Directive which require new action by employers and shipowners.

Will the policy be reviewed? It will be reviewed. If applicable, set review date: 07/2021

Does implementation go beyond minimum EU requirements?	No			
Are any of these organisations in scope?	Micro Yes	Small Yes	Medium Yes	Large 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 (a) it represents a fair and reasonable view of the expected costs, benefits and impact of the policy, and (b) that the benefits justify the costs.

Signed by the responsible Minister: John Hayes

Date: 24th October 2016

Summary: Analysis & Evidence

Policy Option 1

Description: Do Nothing

FULL ECONOMIC ASSESSMENT

Price Base Year 2014	PV Base Year 2015	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 Price)	Total Cost (Present Value)
Low	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 Price)	Total Benefit (Present Value)
Low	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%
--	---------------	------

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: Nil	Benefits: Nil	Net: Nil	
			N/A

Summary: Analysis & Evidence

Policy Option 2

Description: Regulations doing the minimum necessary to transpose Directive 2013/35

FULL ECONOMIC ASSESSMENT

Price Base Year 2014	PV Base Year 2015	Time Period Years 10	Net Benefit (Present Value (PV)) (£m)		
			Low: -0.13	High: -0.06	Best Estimate: -0.09

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.1	0	0.1
High	0.1	0	0.1
Best Estimate	0.1	0	0.1

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

Taking into account existing safety measures, compliance costs are not expected to be significant. There will be costs related to scoping the impact of the regulations and familiarisation. In addition, shipowners are expected to incur costs of undertaking risk assessments, whilst some of these will also incur a cost of applying for an exemption. The costs to the MCA are the staff costs and publication costs of producing guidance.

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

None.

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

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

None

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

Since risks from EMF are believed to be well controlled under existing legislation, no significant benefits are expected from the Regulations.

Key assumptions/sensitivities/risks

Discount rate (%)

3.5

It is assumed following discussion with industry and with HSE that risks from EMF are recognised and well-controlled under existing legislation, and that industry will not need to take significant additional measures to comply with the Regulations. The assessment of costs and benefits is sensitive to this assumption, which is however based on long-standing technical measures in place within the shipping industry and a spread of experience among industry representatives and MCA staff.

BUSINESS ASSESSMENT (Option 2)

Direct impact on business (Equivalent Annual) £m:			Score for Business Impact Target (qualifying provisions only) £m:
Costs: 0.0	Benefits: 0.0	Net: 0.0	
			N/A

Evidence Base

1. Problem under consideration

Background

- 1.1. The Electromagnetic Fields (EMF) Directive 2013/35/EU is the fourth in a sequence of directives that amend the European Commission's original 1993 proposal for a physical agent's directive, regarding the exposure of workers to the risks arising from noise, vibration, artificial optical radiation (AOR) and electromagnetic fields.
- 1.2. The Directive was officially adopted on 26 June 2013 and published in the EU Official Journal on 29 June 2013 (2013/35/EU). In accordance with current treaty obligations it must be transposed and implemented into respective domestic laws across all Member States by 1 July 2016.

Electromagnetic Fields

- 1.3. An Electromagnetic Field is a type of non-ionising radiation that occurs naturally in the environment and as it is created whenever electrical energy is used, is present in virtually all workplaces. The vast majority of field strengths are at such a low level that they will not cause undesired or harmful effects. However there are field strengths in some workplaces that may present a risk. EMFs are not a singular hazard. The term acts as an umbrella title for static, electric, static magnetic and time-varying electric, magnetic and electromagnetic fields with frequencies up to 300GHz. Fields with frequencies higher than 300GHz are considered optical radiation and are not covered in this Directive.
- 1.4. Electric fields are associated with voltage differences and magnetic fields are associated with the flow of an electric current. EMFs are made up of an electric field and a magnetic field in a special arrangement which allows them to travel together away from the equipment that has produced them. They carry power which can be deposited in anything that they intercept. One example of an electromagnetic wave is a radio signal which carries power from a distant transmitter to a radio set.
- 1.5. The Directive deals with EMFs with frequencies up to 300GHz. These fields are produced by a wide range of sources that workers may encounter in the workplace e.g. manufacturing processes and forms of communication.
- 1.6. The EMF Directive considers two general types of risk; direct risks from EMF effects on the body and indirect risks by the EMF affecting other things in the environment that can create a safety or health hazard. The risks arising from exposures to EMF depends on the intensity or strength of the fields and, for some time-varying fields, their frequency as well. (Time-varying means that as time increases, the magnetic field changes).
- 1.7. The risks from EMF are generally already well understood and well managed in the UK through the use of existing legislation: inspectors do not come across many instances of workers at risk and there have been very few incidents or accidents reported in recent years as a direct result of exposure from EMF.
- 1.8. This Directive and the proposed UK EMF Regulations do not address any possible long-term health effects related to EMF exposure. While it is known exposure to EMFs can produce immediate effects, there is no conclusive or well-established scientific evidence or proof of a causal relationship that prolonged or repeated exposure to very weak fields, even over a long period of time, causes cancer or has any other adverse health effect.
- 1.9. The Directive does not cover the risk resulting from contact with live conductors. Measures for the safe use of equipment (for example the Merchant Shipping and Fishing Vessels (Provision and Use of Work Equipment) Regulations 2006, address this risk.

EMF on ships

- 1.10. Most ships of any size will be fitted with or carry some equipment which creates an EMF. This includes radio and satellite equipment, radar powered hand tools, domestic-type galley equipment, welding equipment and generators, and electrical distribution systems.
- 1.11. However in some cases the levels of EMF are not harmful and in other cases seafarers do not generally spend time in sufficient proximity to such equipment so as to create such exposure as to constitute a health and safety risk to seafarers.

The Problem

- 1.12. Exposure from EMF was considered sufficiently serious at a European level for the European Commission to propose a Directive to specify control measures that need to be in place in workplaces across European Member States and for arrangements to be made to enforce these controls.
- 1.13. The first EMF Directive was adopted in 2004 with an April 2008 transposition deadline. However, following adoption, serious concerns were expressed by stakeholders, in particular those from the medical community, as to the potential impact of the implementation of that Directive on the use of Magnetic Resonance Imaging (MRI). Concerns were also raised by the manufacturing sector, particularly the automotive sector, that the Directive imposed disproportionate restrictions on certain industrial activities and would have serious negative economic consequences. Subsequently, the UK following extensive stakeholder engagement successfully argued for an extension to the transposition deadline so these concerns could be addressed. In 2008 Member States agreed to delay transposition of the Directive until October 2013.
- 1.14. The Health and Safety Executive (HSE) led the negotiations for the UK. The UK maintained throughout negotiations that the existing legislative framework was sufficient and that specific legislation on EMFs was unnecessary as current evidence suggests EMF is being managed satisfactorily using the Framework Directive (89/391/EEC), implemented in the UK through the Management of Health and Safety Regulations 1999 (for shore-based industry) and the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997, as amended, (“the General Duties Regulations”, for the maritime sector). Dutyholders are already obliged to manage all hazards in the workplace, including those resulting from EMFs, through risk assessment and adoption of proportionate control measures that reduce the risks to as low a level as is reasonably practicable. However the UK was unable to secure support from other Member States and therefore unable to completely block a new proposal.
- 1.15. Once it was clear the UK was unable to secure repeal of the Directive, HSE worked closely with GB industry stakeholders, the European Commission (EC) and others in Europe, to ensure that the new Directive was more proportionate to the risks, and less burdensome than its predecessor. Due to the emergence of proposals for a new replacement Directive, the 2004 Directive was not transposed into UK law.
- 1.16. On 14 June 2011 the EC published a proposal to replace 2004/40/EC. This included derogations to protect MRI processes, and a proportionate approach for businesses where there was a low-risk of exposure from EMF. Extensive negotiations in Council then took place, with the Council agreeing a general approach in December 2012. Negotiations concluded on 26 March 2013 and the Directive was adopted in June 2013.
- 1.17. Directive 2013/35/EU is intended to ensure that:
 - there is a harmonised regime across all European Member States,
 - dutyholders take action to minimise the levels of EMF to which workers are exposed, and
 - the risks from EMF are controlled so that all workers remain protected
- 1.18. Member States have until 1 July 2016 to implement the Directive.

UK’s Negotiating Objectives and Outcome

- 1.19. The UK’s position throughout the negotiation period was that a specific Directive on EMFs is not needed. However, this position did not receive sufficient support from other Member States to

achieve a complete repeal. The final Directive however does ensure a proportionate response to the risk of exposure to EMF, in the following ways:

- The use of a set of scientific standards for exposure levels, (the International Commission on Non-Ionizing Radiation Protection (ICNIRP) recommendations), as the scientific basis for the Directive, providing credibility in the science community.
- A degree of simplification of technical aspects and calculations, making them easier to understand.
- Flexibility to exceed exposure limits where certain conditions are met.

1.20. In addition, a three-year transposition period was set instead of the usual two years.

Regulatory Background

- 1.21. For the purposes of implementing this Directive, Great Britain (GB), Northern Ireland and Gibraltar collectively make up the United Kingdom. The Health and Safety Executive (HSE) takes the lead for Government for ensuring the Directive's requirements come into force in GB. Gibraltar, and for shore-based industry, Northern Ireland make their own legislation. The Maritime and Coastguard Agency (MCA) completes implementation by putting in place the Directive requirements for UK ships, wherever they are in the world.
- 1.22. Health and safety law in Great Britain (GB) places duties on persons who create risks that relate to work and the workplace, including, in some circumstances, the self-employed.
- 1.23. The HSE/HSE(NI) Regulations will apply to all work involving potential exposure to electromagnetic fields carried out in the United Kingdom, except where such work is carried out on board a ship as part of the normal shipboard activities of the ship's crew, and is carried out under the direction of the master; and is not liable to expose persons at work other than the master and crew to a risk to their safety.
- 1.24. In addition, where work is carried out outside the UK, either on board the ship at sea or in a non-UK port HSE's and HSE (NI)'s Regulations do not apply. The proposed Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Electro-magnetic fields) Regulations are intended to provide the same level of protection to seafarers and other workers on the ship, wherever it is in the world, as the shore based regulations in the UK. (Shore-based workers in non-UK ports may be subject to their own national legislation).
- 1.25. There is no pre-existing legislation applying to ships which specifically deals with the risks from EMF. The master and crew on UK ships are subject to the General Duties Regulations, which implemented the EC "Framework" Health and Safety Directive (Directive 89/391/EC).
- 1.26. These duties require, in summary, that shipowners make an assessment of risks to health and safety and put in place measures to avoid, or if that is not possible, minimise the risk to seafarers, and to protect them from any residual risk. This includes the provision of a workplace, equipment and systems of work that, as far as reasonably practicable, protect the health and safety of seafarers. In addition, seafarers must be provided with information about risks and the safety measures provided, and given training so that they can work safely.
- 1.27. Directive 2013/35/EC builds on those general requirements by introducing specific requirements relating to the health and safety of workers likely to be exposed to EMF at work. It is necessary for all the provisions of Directive 2013/35/EC to be fully implemented in UK merchant shipping legislation in order to meet the UK's obligations to give effect to the Directive. However, in practice, by complying with the general requirements, shipowners will already have in place measures to protect seafarers from the risks from EMF at work. The specific areas where the regulations will require new measures are set out in section 9 of this IA.
- 1.28. These Regulations complement HSE's The Control of Electromagnetic Fields at Work Regulations (S.I. 2016/558, made in May 2016 and coming into force on 1 July 2016), by implementing Directive 2013/35/EC for activities to which those regulations do not apply (work activities of the master and crew of sea-going ships).

2. Rationale for intervention

- 2.1. There are a number of market failures which necessitate Government intervention. There may be information asymmetry in that seafarers may not be aware of the equipment on board or the effects of that equipment before committing to a voyage. Some shipping companies may have monopsony power in the employment of seafarers [i.e. there is little incentive for shipowners to make improvements to health and safety as there is limited risk of their staff going elsewhere] and may not face the usual competitive pressures to make improvements in relation to EMF.
- 2.2. Any attempt for the market to enforce this standard without Government enforcement would suffer from co-ordination failure, any company would have an incentive to be a free rider, benefitting from the reputational benefits of the measures without having to implement them themselves.
- 2.3. The rationale for the transposition approach takes full account of the UK Government's Guiding Principles for EU Legislation and the Government remains committed to regulating only where it is necessary to do so.
- 2.4. The UK is obliged to implement all EU Legislation, which includes European Directives. If the UK does not reflect these new requirements in its domestic law, it would not be following current Government policy nor meeting, in full, its EU law obligations by which it is currently bound.

3. Policy objectives

- 3.1. Not to implement the directive is not a viable option in practical terms because it will not deliver the UK's obligations under EU Law. Whilst the UK Government continues to believe that the UK's current legislative framework is sufficient for duty-holders to effectively manage EMF in the workplace, failing to implement the new requirements of the Directive will not be consistent with the Government's current transposition policy.
- 3.2. In considering the best method to transpose the Directive's requirements into Domestic legislation by July 2016, the policy objectives are therefore to:
 - Follow government policy and transpose the Directive in line with EU Treaty obligations;
 - Ensure seafarers remain protected from adverse health and safety risks by ensuring exposure to EMFs continue to be assessed and controlled where necessary;
 - Ensure existing control measures already in place are taken into account so any burdens on businesses are minimised.
- 3.3. The intended effect is to implement the Directive in a way that is proportionate to the risks and takes into account existing controls and therefore minimises the impact on businesses.

4. Description of options considered

Option 1: Do nothing

- 4.1. The "Do nothing" option in this case would mean that the EU Directive would not be implemented and the UK would not take any other action to address occupational health and safety risks from EMF. The 'Do Nothing' option is different from a scenario where the UK does not implement the directive and the rest of the EU does. The 'Do Nothing' scenario consists of a situation where the Directive as a whole was never enacted in the first place and provides the notional baseline against which the other options are assessed.

Option 2: Introduce a new set of health and safety regulations that only transpose those parts of the Directive not already covered by existing legislation

- 4.2. Option 2 is the MCA's preferred option and follows, as far as possible, the approach taken in the proposed HSE regulations [See IA HSE 0093]. It follows the UK Government's transposition guidance and its obligation to implement the EU Directive into domestic law. This approach

minimises burdens to UK industry by helping them focus only on the new requirements contained in the Directive. MCA will introduce the Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Electromagnetic Fields) Regulations 2016 which will follow the same approach, as far as is appropriate, as HSE's Control of Electromagnetic Fields at Work Regulations 2016, to ensure a consistent approach across both regulators. Separate regulations for shipping have the following benefits:

- a) The various Merchant Shipping regulations are applicable to UK ships and other types of vessel wherever they may be in the world. They are also applicable to non-UK ships when in UK waters on a "no more favourable treatment" basis.
- b) The regulations are specifically drafted with ships in mind and whilst they may contain provisions brought forward from earlier Merchant Shipping Regulations, in order to avoid lowering existing standards, MCA seeks not to "gold plate" Directive requirements.
- c) The policy of implementing EC Directives for the maritime and fishing sectors by means of regulations specific to merchant shipping and fishing vessels is a well-established and widely used practice with which industry is familiar.

4.3. This option and the new requirements are analysed in more detail in the costs and benefits discussion below.

Other approaches considered: Amend existing legislation to incorporate the new requirements

4.4. HSE considered amending existing regulations to incorporate the new requirements contained in the EMF Directive. This would be in line with the Government's policy to reduce the volume of regulation. The existing vehicle which was considered most appropriate was the Control of Artificial Optical Radiation (AOR) at Work Regulations 2010. There are parallel Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Artificial Optical Radiation) Regulations 2010, which the MCA could have amended in the same way.

4.5. The main advantage of this approach would have been that those duty-holders who manage the risks from both AOR and EMF would have to refer to only one set of Regulations and guidance. However, in order to find out what they needed to do to comply with existing duties in respect of EMF, duty-holders would inevitably read (or, for those who are already familiar with AOR, re-read) the whole AOR regulations unnecessarily. Whilst there are some similarities the EMF and AOR Directives have some very different considerations, and merging these could lead to duty-holders being confused, muddling them up and even misinterpreting them. This could lead them to take inappropriate or unnecessary actions, thereby increasing the burden on UK businesses and reducing the levels of compliance.

4.6. In comparison with Option 2 therefore HSE believed that amending existing legislation to implement the EMF directive would have created additional costs for industry, in respect of staff time for familiarisation, without bringing any safety benefit (or reducing benefits because of the risk of confusion identified above).

4.7. For the same reasons as HSE therefore, the approach of amending existing regulations was ruled out at an early stage and was not considered as a valid policy option for the maritime sector in this IA. No comments were received in response to the consultation exercise to support this approach.

5. Consultation

5.1. As well as drawing on the expertise of its own staff, MCA consulted the National Maritime Occupational Health and Safety Committee (NMOHSC) in 2014 and 2015 on sources of EMF on ships and likely impacts of the regulations. The view was that the risks from equipment on ships which generates EMF were understood and that current good health and safety practice managed the risks adequately; however guidance was needed to fully understand the requirements of the Directive and how to demonstrate compliance. Public consultation on draft regulations was held between 14 March and 6 May 2016. Forty-two organisations, including a number of maritime trade associations with large memberships, were notified of the consultation exercise, and documents were posted on the MCA pages of the www.gov.uk website to which interested organisations and

individuals subscribe. The consultation page was viewed 836 times during the consultation period, and the documents were downloaded 59 times.

- 5.2. Only 5 responses were received to the consultation which supports the view that there is little concern within the industry about the impact of the Regulations. No additional types of equipment which might give rise to EMF exposures on ships (see Annex 4) were proposed. In addition, consultees were requested to provide evidence, where available, on the types of work carried out on ships which could expose workers to electromagnetic fields; the effects of any such exposure; and any costs and benefits that are foreseen as likely to arise from the introduction of the proposed EMF Regulations. No evidence was provided, and no comments were received on the cost assumptions underlying the assessment of costs and benefits in this IA.
- 5.3. In the light of responses, MCA will review the guidance to address some of the concerns raised – for example ensuring that the right balance is struck between recognising the risks to health and safety from exposure to EMF above the action level/exposure level, and recognising that existing good practice will be managing those risks to ensure the health and safety of seafarers. A question has also been raised about whether the lack of reports of harm from EMF may result from a lack of awareness/understanding of the issues. However, no evidence has been provided of any harm relating to EMF. The MCA believes that the publication of the regulations and guidance will raise awareness among seafarers and will monitor the situation in case this triggers reports as seafarers become more familiar with the risks and symptoms they may suffer from EMF. In the event of evidence of a problem, MCA will review the guidance and the regulations will be subject to statutory review in 2021.
- 5.4. Consultees were invited to provide evidence on:
 - Any work activity on UK ships where an exemption may be applicable, in order to ensure that as many situations as possible are covered
 - The familiarisation costs associated with the EMF Regulations
 - The benefits of the proposed EMF Regulations to the shipping or fishing industry
 - The potential for the EMF Regulations to impact on competition
 - The potential impacts of the EMF Regulations on small firms and to comment on the assertion that there are unlikely to be health and safety risks from EMF on small vessels.

However, there was no evidence provided on any of these areas.

6. Requirements of the Regulations

Current management of risks

- 6.1. Although there are no specific regulations for EMF applying to UK ships, the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 (as amended – “the General Duties Regulations”) address the general principles of how hazards in the workplace need to be managed, through risk assessment and adoption of proportionate control measures to ensure the risks as minimised as far as is reasonably practicable. The General Duties Regulations are therefore routinely used on board ships to manage the risks from EMF.
- 6.2. MCA is not aware of any ships, and no consultation responses provided evidence that there are ships, where EMF levels are at such a level that exposure of seafarers to EMF levels needs to be measured, in order to inform appropriate risk management. The risks are generally already understood and appropriately managed.

7. Ships and seafarers affected by the Regulations

- 7.1. The number of UK vessels expected to be covered by the regulations is set out in the table below.

Table A1: Number of UK ships from UK Ship Register (As of Jan 2015)

<i>Type of vessels</i>	<i>No. of vessels</i>
<i>Merchant ships</i>	1,179
<i>Small commercial vessels</i>	4,800
<i>Fishing vessels</i>	5,717

- 7.2. Many of these vessels will be operated by the same company - the number of businesses engaged in Water Transport activities was 1,482 in 2013, with a further 3,404 engaged in Fishing activities in 2013. It is therefore our best assumption that the 4886 businesses own these vessels
- 7.3. Most ships and fishing vessels will carry some equipment which creates electromagnetic fields (EMF). This includes generating equipment, power cables and transformers, navigational equipment including radars, radio equipment, power tools, galley equipment, televisions and mobile phones.
- Examples of equipment creating low-level EMF are alarm systems, hand-held radios and galley equipment such as refrigerators, ovens, etc.
 - Examples of equipment where EMFs are reduced by distance are satellite communications equipment and radar. When radar and other navigation equipment is installed, the manufacturer /installer marks safe distances on the deck which are understood and observed by crew members.
 - Examples of equipment where shielding or screening or other mitigating measures are already in place are generators and insulated cabling.
- 7.4. The EU has produced guidance which lists types of equipment which produce EMF which can be assumed to fall below the thresholds laid down in the Directive and requiring protection for workers. Mobile phones, any domestic appliances, and use of power tools are on that list.
- 7.5. In addition, the strength of EMFs can be controlled by screening, and reduce significantly with distance from the source of EMF. The risks from such equipment are well-known and understood by the shipping industry and as a result:
- where EMF created is at or above the action levels or exposure level values in the Directive, working procedures ensure that seafarers are not working in proximity to the equipment and the strength of EMFs reduce quickly and significantly with distance; or
 - mitigating measures such as shielding and screening are already in place;
 - where equipment generates potentially harmful levels of EMF, the hazard is recognised and risks are well understood by shipowners and seafarers, such that safety measures are in place and are observed
- 7.6. The maritime sector is more frequently using vessels that are designed to be all-electric propulsion systems. The generating sets on board may develop anything from under 15kW (on an 18m workboat, for example) to as much as 2 megawatts on a large passenger ship, sufficient to power a small city. The currents are delivered around the ship systems by a set of busbars. As part of a project investigating all electric vessels for MoD, Qinetiq conducted research on board the RMS Queen Mary 2 to assess the EMFs around the systems. This represents a ship at the top end of the range. Even though space is at a premium on board maritime vessels, the general conclusion was that EMFs measured in the passage and companion ways was not cause for concern. As with any very high current operation, workers close to live conductors may be exposed near or at the ELVs. Similar situations may also exist on board offshore installations in the oil and gas sectors. The superstructure of vessels may have communications antennas installed close to where workers may need to pass.
- 7.7. However, time averaging may be used to control individual's exposures so that EMF experienced by seafarers are expected to fall below the thresholds which require assessment.
- 7.8. This impact assessment considers only the cost to UK businesses, as has typically been the case with maritime impact assessments. UK-flagged ships are a proxy for UK businesses as, given the international nature of the shipping industry, it is not realistically possible to determine whether ships belong to UK businesses, or those from elsewhere with a great degree of accuracy. Although there

will be costs to non-EU businesses, which will not necessarily already be compliant with the regulations, operating within UK territorial waters, the Department does not propose to estimate these, given that there is no precedent for doing so.

8. Workers at particular risk

- 8.1. In addition, the Directive requires consideration to be given to workers who may be at particular risk from EMF, for example because they have automatic implanted medical devices (AIMDs) such as pacemakers, defibrillators, or cochlear implants, or because they wear equipment such as insulin pumps, which could be affected by EMF.
- 8.2. Equipment on ships as a result of which EMF may affect such equipment includes hand-held radios (VHF, UHF, MF) and power tools.
- 8.3. Seafarers are required to meet good standards of medical fitness, and hold a valid statutory medical fitness certificate. The medical certificate issued will, where necessary for clinical reasons, state any restrictions on the type of work they can perform on board. Alternatively the doctor conducting the examination may issue a confidential letter to the seafarer explaining any conditions to be met. Seafarers are also required to declare to the master any medical treatment they are receiving (such as medication) if this is likely to affect their performance. The statutory medical fitness standards for seafarers do not prohibit those with some AIMDs from holding roles which might involve exposure to EMF. However, since patients undergoing such treatment will be given warnings about any harmful effects relating to such devices which might arise from their work, it is expected that anyone potentially at risk for this reason would already be aware, would have notified their employer/supervisor and steps would already be being taken to ensure that they were not exposed to risks from work equipment etc.
- 8.4. Given the measures already in place, it is therefore not expected that there would be any costs arising from the Regulations in respect of seafarers being treated with equipment affected by EMF.
- 8.5. Pregnant workers may also be at risk as a result of the thermal effects of EMF. MGN 522(M+F) already identifies this risk, and the mitigating measures to be taken, so there are not expected to be any new costs in respect of pregnant workers as a result of the new Regulations.

9. Costs and Benefits of Option 2

Costs of the proposed legislation to transpose only the minimum mandatory standards

Baseline

- 9.1. The 'Do Nothing' scenario represents what would happen if the Directive had not been enacted. In other words it is the counterfactual, or baseline, against which the costs and benefits of policy options can be compared. In the "do nothing" scenario the new safety and living standard improvements are not made and vessels maintain a business as usual approach compliant under UK law. Vessels will not try to implement these reforms without the Directive as they would be at a competitive disadvantage without some government enforcement as identified in the Rationale for Intervention section.

Costs for business

- 9.2. The provisions of the EMF Directive which mirror those in the General Duties Regulations are:
 - Assessing and controlling the risks, which would include EMF, on board ships
 - Providing suitable controls which includes measures such as choice of equipment, technical or organisational measures, signage and limiting access to areas where appropriate, maintenance of equipment and design of workplaces, availability of adequate personal protective equipment
 - Consideration of seafarers at particular risk
 - Consultation and participation of seafarers
 - Having competent persons or services

- The provision of information and training for seafarers
 - The provision of health surveillance where appropriate
- 9.3. Since shipowners are already required to meet these requirements under the General Duties Regulations, and since it is clear from discussions with industry that the risks from EMF are well-understood through instructions from manufacturers, seafarer training etc., it is not expected that any new costs will arise as a result of the focus brought to bear by the new Regulations on EMF.
- 9.4. The new requirements introduced by the Regulations are –
- *Carry out a suitable and sufficient exposure assessment of the level of EMF to which workers will be exposed;*
 - a) This requirement is in addition to the requirement to assess the level of risk to workers under the General Duties Regulations. Employers must assess the level of exposure to EMF against a set of specific values laid down in the Directive.
 - b) These specific values are called “Action Levels” (ALs) and Exposure Limit Values” (ELVs) in the Directive. Different frequency ranges have different ALs and corresponding ELVs. More information is given at Annex 3 to this IA. On ships where EMF is at such a level that it is unlikely to cause harm, levels can easily be assessed through the use of existing sources of publicly available information without the need to take measurements. Such information includes instructions provided by equipment manufacturers and sector specific information, and will be supplemented by national guidance supporting these Regulations. The EU has also published the **Non-binding guide to good practice for implementing Directive 2013/35/EU Electromagnetic Fields**. This is available in English and can be found and downloaded at <http://ec.europa.eu/social/main.jsp?catId=82&langId=en&furtherPubs=yes>.
 - *Consider and apply a derogation where appropriate*
 - a) The Directive contains derogations, which apply if certain conditions are met
 - i. Magnetic Resonance Imaging (MRI) equipment for use in the health sector: Some of the larger cruise ships may include MRI scanners in their ship’s hospital. There are no known significant issues with the use of MRI scanners when used in accordance with the manufacturers’ instructions and with appropriate training and safety working practices in place. The health and safety risks associated with the use of MRI in the health sector are already well managed.
 - ii. Any work situation where the health ELV is exceeded, as long as the following conditions are met:
 - All technical and organisational measures have been applied to reduced exposure to the lowest level reasonably practicable;
 - The specific characteristics of the workplace, work equipment or work practices have been taken into account; and
 - Employees are still protected against adverse health effects and safety risks.
 - b) Equivalent or more specific protection systems may be allowed for personnel working in operational military installations or involved in military activities, provided health and safety risks are prevented. There is also a general provision in health and safety legislation that where a ship is being used for public service or civil protection activities and the activity inevitably conflicts with a legislative provision of the Regulations, that provision does not apply to the extent of that conflict, provided that the health and safety of seafarers is ensured so far as is reasonably practicable.
 - c) In order to integrate this provision into the current inspection regime for ships, the regulations make provision for issuing exemptions against the above criteria where appropriate. It is proposed to provide a list of activities under the second bullet point where an exemption from exposure limit values may be appropriate, based on the list developed by HSE for shore-based industry. Providing this list will minimise the cost for duty-holders.

- d) Duty holders would not be required to prove that ELVs are exceeded before making use of the exemption, but would have to comply with exemption conditions at all times to ensure that workers are protected.
- *Once it has been determined EMF exposure is above the AL take action to eliminate and reduce the level of EMF to which workers are exposed.*
 - a) Following consultation with the National Maritime Occupational Health and Safety Committee, the MCA believes that measures are already in place to protect workers on board ships such that EMF exposure is not above the AL.
- *Devise and implement a specific EMF risk assessment where there is a risk that the sensory and health effects ELV may be exceeded, and include in the assessment additional measures that may be required for workers who are considered at particular risk,*
 - a) Following consultation with the National Maritime Occupational Health and Safety Committee, the MCA believes that measures are already in place to protect workers where the sensory and health effects ELV may be exceeded. This should already be recorded in the risk assessment carried out under the General Duties Regulations.

9.5. The costs generated by the new requirements can be split into four broad categories of costs:

- i. **Scoping** – Although all shipowners will need to be aware of the new Regulations, for many it will be possible tell from a very rapid review of the regulations and guidance that they have no practical relevance for them.
- ii. **Familiarisation** – For those shipowners for which the Regulations appear to be of practical relevance, it will take time to familiarise themselves with the new requirements.
- iii. **Assessment of exposure levels** – For those shipowners for which the Regulations appear to be of practical relevance, shipowners will be required to update their risk assessments
- iv. **Recording exemption** – There will be shipowners that, after having assessed their exposure levels, find that they exceed ELV but are able to apply for a derogation. There will be a small administrative cost of recording this exemption.

Scoping costs

- 9.6. The provision of clear guidance to the industry will help to keep the cost of scoping to a minimum. Given that exposure to hazardous electromagnetic fields might potentially occur only in very limited circumstances and on relatively few vessels, the MCA considers that the costs of scoping the impact of the Regulations for most maritime businesses will be very limited.
- 9.7. We have assumed that all businesses undertake scoping to understand whether they are bound by the regulations. The number of businesses engaged in *Water Transport* activities was 1,482 in 2013, with a further 3,404 engaged in *Fishing* activities in 2013. This is based on data from the ONS Annual Business Survey. This data has been used to produce estimates of the potential scoping and familiarisation costs, and the costs of recording exemptions.
- 9.8. We assume that one member of staff would have to spend a very short amount of time checking whether they are in scope of the new requirements in the Directive. For these purposes, there will be a non-exhaustive list of workplaces and equipment where EMFs are not a risk, and they will be clearly highlighted in the guidance.
- 9.9. We previously assumed that one person would spend just five minutes considering whether their equipment posed any risk from EMF. Consultation undertaken by the HSE found that five minutes was an underestimate, and as such for this IA, we have assumed that one person would spend ten minutes on scoping in line with the HSE's revised estimate, +/-10% to reflect uncertainty in the assumptions. ***This indicates a best estimate of around £13,800.*** Calculated as follows: 4886 (number of companies affected) x £2.833 (i.e. £17 i.e. wage inc. uplift x 0.16 i.e. 10mins).
- 9.10. This IA assumes a wage rate of £17 per hour ('Science, engineering and technology professionals, ASHE 2015'¹, up-rated by 1.2 for non-wage costs as per DfT WebTAG Guidance and Eurostat to include mainly National Insurance contributions and pensions².). This estimate is based on UK

¹ <http://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/earningsandworkinghours/datasets/occupation2digitsocashetable2> Table 2a -wage rate of £14, uprated by 1.2 brings it up to £17.

² http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Labour_cost

wages. It is possible that in some companies the familiarisation exercise would be carried out by staff based overseas, where wage rates are likely to be considerably lower than those in the UK. However, it is considered most likely that this function, based on UK regulations, would be carried out in the UK.

Familiarisation

- 9.11. There will be familiarisation costs arising from the introduction of the new Regulations. It is assumed that one person in each company will have to familiarise themselves with the requirements in order to assess whether any additional measures are required. This is expected to take on average two hours per company for the responsible person to review the new requirements, the likely application within the company and to decide whether further action is necessary. This is the amount of time that HSE estimate for familiarisation for “less well-informed” stakeholders, and was revised upwards from one hour after consultation. While technical personnel on board merchant ships are likely to be familiar with EMF, those ashore dealing with the Company’s safety management system may not themselves be specialists. MCA will issue guidance which will highlight types of equipment which will not require further action under this legislation, which will facilitate this process.
- 9.12. We assume that those companies that are deemed within scope of the Regulations will familiarise themselves with the specific requirements. Our best estimate, based on the work carried out by HSE and accepted by the marine industries during consultation, is that 10% of companies will be in scope (with a high and low estimate of 20% and 0% respectively to reflect uncertainty). We also conservatively assume that for an additional 30% of businesses it will not be immediately obvious that they are out of scope, and they will therefore incur familiarisation costs. This implies that 30% (low), 40% (best) and 50% (high) of businesses will bear familiarisation costs. **Assuming a £17 per hour wage cost, the total one-off cost of familiarisation will be £66,500 in the best estimate.** Calculated as: 1954 (40% of all businesses) x £17 (wage + uplift) x 2h.

Assessment of exposure levels

- 9.13. Those sectors where EMFs are a significant risk already assess levels of EMF to comply with current requirements. The additional costs for these sectors will be in assessing exposure against the specific values in the new Regulations and updating their risk assessments.
- 9.14. Since shipping companies are unlikely to employ people with the appropriate expertise to accurately assess EMF exposure, it is assumed that where initial assessment indicates that exposure may be above the action levels (AL), companies will decide to put in place mitigating measures, rather than undertaking, or paying others to undertake, the additional assessment required to establish whether Exposure Limit Values (ELVs) are exceeded for particular seafarers or groups of seafarers.
- 9.15. Any assessment regarding workers who are at particular risk would have to be considered case by case. As already explained, existing legislation requires an employer to consider any particular risks to pregnant workers and young persons in carrying out their risk assessments. Those with AIMDs should already be informed of any potential risks from their work and employers should therefore be taking appropriate measures. No new costs are expected in respect of these groups.
- 9.16. It is estimated, based on HSE assumptions, that the time taken to undertake the exposure assessment, record the findings and update the risk assessment will be around one hour. It also represents an average covering situations that will range from dutyholders who simply need to refer to instructions provided by equipment manufacturers to dutyholders who have to refer to more detailed guidance (e.g. industry guidance) and identify their particular equipment. **Assuming a £17 per hour wage cost, the total one-off cost of assessing exposure levels will be £8,300 in the best estimate.** Calculated as 489 (10% of all businesses) x £17(wage + uplift) x 1h.

Recording exemptions

- 9.17. As explained above, it is proposed to identify and publish a list of as many situations as possible, which fall within the scope of the permitted derogations, and where exemptions may apply, and to ensure that the list can be easily updated. This will minimise the cost of identifying the applicability of, and applying such exemptions so that there is no disincentive to apply for an exemption. Where a ship owner relies on such an exemption, the conditions attached to that exemption must be complied with. However, since the conditions attached to exemptions relate to having effective controls in place to minimise risk, and since – as outlined above – we believe the industry is already

effectively controlling risks from exposure to EMF – there should be no cost to ship owners in complying with such conditions.

There will be a small administrative cost to existing companies which apply for an exemption, recording that an exemption is being applied, and the conditions complied with. This is estimated at 30 minutes per company affected (with +/- 10% as sensitivities). We have conservatively assumed that all businesses affected by the proposals, will find exposure to EMFs exceeding ELVs, and will incur a cost of applying for exemptions. **Assuming a £17 per hour wage cost, the total one-off cost of recording an exemption will be £4,100 in the best estimate.** Calculated as 489 (10% of all businesses) x £17 (wage + uplift) x 0.5h (30 min).

Mitigation

9.18. The directive does not introduce any additional mitigation requirements relative to the existing General Duties Regulations.

Assumptions

9.19. As there has been no growth in ship numbers on the UK shipping register in the last few years, there is no basis on which to estimate the number of new businesses which may be set up in coming years, and which would then incur costs as a result of the Regulations.

9.20. Given the limitations of the available evidence base there are a number of key uncertainties in the analysis. For example, there is no data readily available on the types of work carried out on ships which could expose workers to electromagnetic fields nor the effects of any such exposure.

9.21. Following HSE's approach, it is assumed that there are no UK ships on which exemptions cannot be applied, since control measures are already in place to protect workers. HSE covers a wider range of industrial activities and therefore equipment generating EMF than the maritime sector, and it is therefore considered reasonable to make this assumption.

Costs for MCA

Publishing information

9.22. MCA will publish a Marine Guidance Note provided advice to shipowners on the Regulations, including guidance on how to make use of the derogations provision, in order to make it as simple as possible for them to comply. This is expected to involve about five days of staff time, plus the publication cost for a Marine Guidance Note (wage costs are estimated at about £139 per day, based on MCA wage rates uplifted by 30% to account for non-wage costs (MCA Finance Guideline), plus £75 for publication) – about £980.

Monitoring & Enforcement Costs

9.23. The Regulations will be monitored and enforced by the Maritime & Coastguard Agency in the UK, and other EU maritime administrations when UK ships visit ports in other EU countries, in line with current practices for monitoring the implementation of other EU Health and Safety Directives. It is not anticipated that this will result in any additional, non-negligible costs for MCA.

Summary of Monetised Costs

9.24. The monetised costs consist of costs to the MCA of publishing the marine guidance note and scoping, familiarisation costs and, for some, the costs of applying exemptions for shipping businesses. The costs of publishing guidance consists of staff and publishing costs. There is a large degree of certainty of these costs due to available information on wages and MCA experience of publishing this type of guidance before. The cost of publishing therefore remains constant over all scenarios. Familiarisation costs for shipowners follow the two scenarios detailed above, with a central estimate halfway between both high and low scenarios.

Table A2: Summary of monetised costs (2014 prices £)

	Low	Central	High
Scoping			
Number of business affected	4,886	4,886	4,886
Scoping time (hours)	0.15	0.17	0.18
Wage (£/hour)	17	17	17
Total (£)	12,585	13,844	15,228
Familiarisation			
Proportion of businesses affected	30%	40%	50%
Number of business affected	1,466	1,954	2,443
Familiarisation time (hours)	1.82	2	2.20
Wage inc. uplift (£/hour)	17	17	17
Total (£)	45,307	66,450	91,368
Assessment of exposure levels			
Proportion of businesses affected	0%	10%	20%
Number of business affected	0	489	977
Assessment time (hours)	0.9	1	1.1
Wage inc. uplift (£/hour)	17	17	17
Total (£)	0	8,306	18,274
Recording exemption			
Proportion of businesses affected	0%	10%	20%
Number of business affected	0	489	977
Exemption time (hours)	0.5	0.5	0.5
Wage inc. uplift (£/hour)	17	17	17
Total (£)	0	4,153	8,306
MCA - Publishing information (£)	980	980	980
TOTAL	58,872	93,733	134,156

Benefits

9.25. The Government believes that there are very limited, if any, monetised or non-monetised benefits for the maritime sector with respect to this Directive, since it is considered that the risks that exist are satisfactorily managed already by duty holders, in compliance with existing General Duties Regulations.

Rationale and evidence that justify the level of analysis in this IA

9.26. Directive 2013/35/EU introduces measures intended to protect workers from any risks to their health and safety which may arise as a result of their exposure to electromagnetic fields whilst at work. The UK is obliged to implement all EU health and safety Directives, or face the risk of infraction for failure to implement the Directive fully or at all.

9.27. The EMF Regulations are intended to implement Directive 2013/35/EU to the minimum level necessary to meet the EU requirements. MCA does not however have any information on the incidences of hazardous levels of electromagnetic fields occurring on ships and other vessels so is not currently able to quantify the likely costs and/or benefits resulting from the EMF Regulations. Evidence on specific impacts was sought through the consultation exercise but no information has been supplied.

9.28. This assessment also takes into consideration the findings of a parallel consultation exercise held by HSE which tested their assumptions on the impacts of the Regulations. As a result of feedback from the HSE consultation, the costs associated with scoping, familiarisation and assessment of

exposure were increased for the final IA. Those amended costs are reflected in this IA. The costs remain very low overall, and further analysis of the impacts is not therefore considered necessary or indeed feasible.

10. Risks

- 10.1. The EMF Regulations need to be implemented in order to complete UK implementation of Directive 2013/35/EU on worker exposure to Electromagnetic Fields at work. Failure to implement Directive 2013/35/EU on time could result in EU infringement proceedings with a consequential substantial fine for the UK with ongoing daily fines until such time as the UK does fully implement the Directive.

11. Specific impact tests

Equalities Assessment

- 11.1. In line with other regulations which implement EU health and safety Directives, the EMF Regulations will be applicable to all seafarers working on UK sea-going vessels to which the Regulations apply, irrespective of their age, ethnic origin, gender, nationality, race, sexual orientation or disability. These proposals are therefore considered to have no adverse impact as regards statutory equality duties.

Competition Assessment

- 11.2. The EMF Regulations will ensure that UK legislation is in line with the requirements of Directive 2013/35/EU and thereby the requirements of other EU states which have implemented it thus facilitating trade on a “level playing field” and reducing the risk of UK ships being delayed or detained for non-compliance. As there is no international legislation regarding risks from EMF on ships, this could in theory put UK and other EU-registered ships at a disadvantage in comparison with non-EU ships. However, if those ships call in UK or other EU ports, it is likely that they generally seek to apply the same standards as EU ships, since they could otherwise be subject to enforcement action by the port State. This would suggest that, like UK ships, most non-EU ships are already taking steps to address risks from EMF. This, taken alongside the assessment of how few UK ships will incur costs as a result of this Directive, is expected to mean that the effect on competition is not significant.
- 11.3. Consultees were invited to offer any evidence on the potential for the EMF Regulations to impact on competition. No evidence was provided.

Small and Micro Business Assessment

- 11.4. There is no specific exemption from the Directive for small firms and therefore it is possible that the EMF Regulations could impact on small firms. EU Directives are however intended to protect the health and safety of all workers. No data is available on the number of small and micro businesses operating UK ships.
- 11.5. Taking into account the capital costs of obtaining and running a large ship, it is assumed that small and micro businesses are most likely to operate small vessels. Small commercial vessels (under 24m in length) are therefore used in this assessment as a proxy for small businesses. There are an estimated 5500 small commercial vessels operating under the UK flag [Source: SCV Database January 2013], of which about 700 are sailing yachts, offered for charter for leisure use, without a paid crew. The Directive does not apply to such vessels since there are no workers on board.
- 11.6. Of the remaining 4800, it is envisaged that the majority of vessels operated by small businesses are unlikely to be fitted with plant or equipment emitting EMF at levels harmful to workers, although some passenger-carrying workboats, for example those transferring workers to wind turbines through busy construction sites, may carry a high concentration of radar and other navigation equipment on board. It is therefore expected that such firms are already doing what is necessary through risk assessment and mitigating measures carried out under the General Duties Regulations and so will not incur additional costs under the EMF Regulations.

11.7. Consultees were invited to provide any evidence on the potential impacts of the EMF Regulations on small firms and to comment on the assertion that there are unlikely to be health and safety risks from EMF on small vessels. No evidence was provided.

Health Impact Assessment

11.8. The objective of Directive 2013/35/EU is to protect seafarers from the risks to their health and/or safety as a result of the presence of electromagnetic fields in the workplace. The health effects of EMF are discussed in Annex 2.

Human Rights

11.9. The EMF Regulations implement provisions of EU Directive 2013/35/EU, which is applicable to, and must be implemented by, all EU Member States. They are applicable to all seafarers employed on Member States' vessels and there are accordingly no human rights compatibility issues arising from these Regulations.

Justice System

11.10. The main enforcement mechanism for the EMF Regulations will be through the inspection of UK ships by MCA surveyors. The EMF Regulations contain provisions regarding the commission of offences by breaching the requirements of the Regulations and the imposition of penalties in respect of such breaches.

12. Reducing regulation policy

Direct costs and benefits to business calculations (following OI3O methodology)

12.1. As these requirements are European in origin, and the Regulations do not gold plate the EU requirement (i.e. do not go beyond the minimum necessary for implementation), the measure is considered a Non-Qualifying Regulatory Provision (NQRP) under administrative exemption A. The measure is out of scope of One-in Three-out (OI3O) and will not score against the Business Impact Target (BIT).

Copy out

12.2. In preparing the EMF Regulations, Government policy on "copy out" has been applied for those provisions of the Directive which require transposition as a means of transposing international legal requirements wherever possible. However, the Directive was not always drafted in a manner which facilitates this approach, and further elaboration is required in some cases.

Alternatives to regulations

12.3. Introducing the requirements without recourse to regulation has been considered. However, Article 9 of Directive 2013/35/EU requires Member States to provide for adequate penalties applicable in the event of infringements of national legislation adopted pursuant to this Directive. These penalties are required to be effective, proportionate and dissuasive. Implementing the Directive other than by the use of regulations is therefore not an approach open to us.

Review clauses

12.4. The EMF Regulations include a standard clause which requires a Ministerial review five years after they are made, and every five years thereafter, in line with the "review policy" on introducing international obligations. We will monitor developments in the understanding of the health effects of EMFs and will consult shipowners and seafarer unions on the practical impact of the regulations on ships in the light of experience. We will also discuss with HSE, and consider whether any parallel lessons learnt from shore-based industry can be applied to work activities on board ships.

13. Summary

- 13.1. Option 1 (Do nothing) would not meet the UK's EU obligations.
- 13.2. Option 2 - The introduction of the Regulations, to implement Directive 2013/35/EU to the minimum necessary to meet the requirements of that Directive, following as far as appropriate the approach taken by HSE - is the only option that would both be acceptable to the EU and meet the Government objective to minimise the cost burden of the Regulations on business and is therefore the preferred option.

14. Implementation plan

- 14.1. The EMF Regulations are necessary to give effect to Directive 2013/35/EU in respect of UK ships wherever they are and to non-UK ships when in UK waters. It is intended that they will come into force as soon as possible after 1 July 2016 which is the implementation date specified in the Directive. This should ensure that the UK will not be infracted.
- 14.2. A Marine Guidance Note will be published to accompany the Regulations which will explain the provisions and give guidance on their practical interpretation, including the list of situations where exemption/derogations may apply. This will be made available on the MCA pages of the www.gov.uk website.
- 14.3. The primary enforcement mechanism for these Regulations on UK ships will be through Flag State inspections and for non-UK ships by means of Port State Inspections as part of wider health and safety inspection. MCA surveyors would in both cases check for compliance with the requirements of the EMF Regulations. Initially non-compliance would be dealt with by giving guidance and possibly prohibition of an activity on the vessel until matters had been corrected. However in cases of blatant disregard or consistent failure to comply with the EMF Regulations, detention of the ship or prosecution would be considered as a last resort.

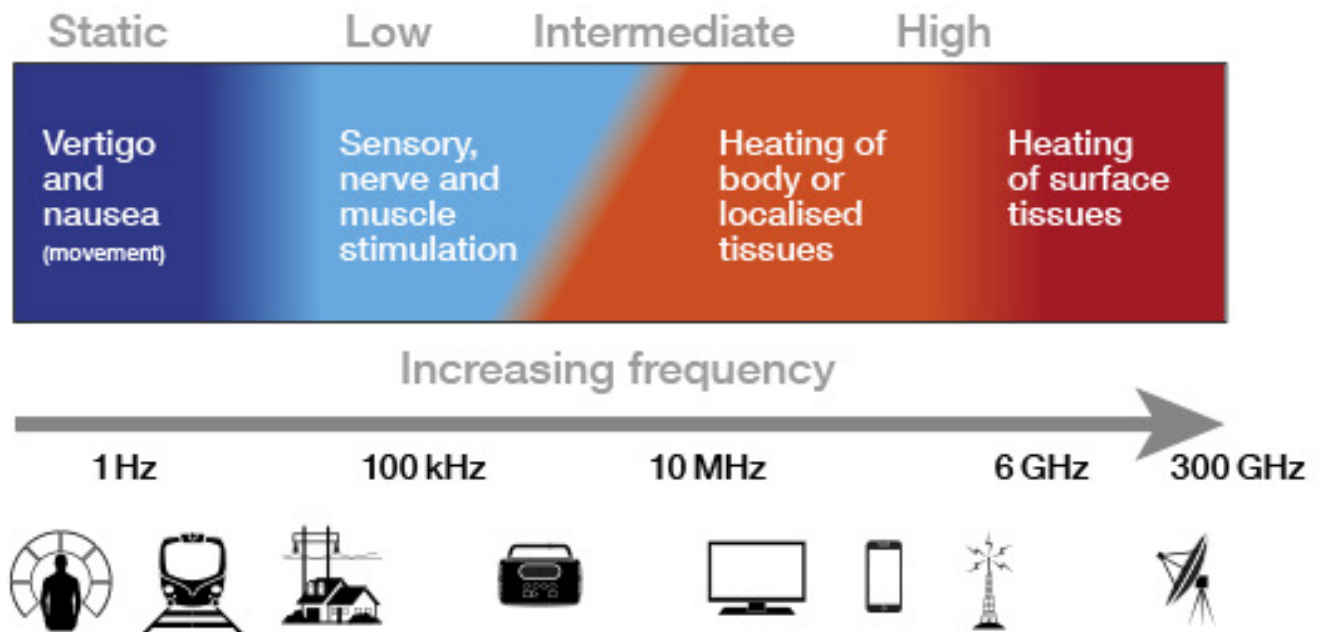
Annex 1 - Direct and Indirect effects from EMF on the body

Direct effects

1. The mechanism for interaction between the external environmental field and a person changes according to the type of EMF. The type of effect that EMFs have on people depends primarily on the frequency and intensity: some fields cause stimulation of sensory organs, nerves and muscle, while others cause heating. The effects caused by heating are termed 'thermal effects' while all other effects are termed 'non-thermal'.
2. Extremely low-frequency or pulsed EMFs can create the perception of a flickering effect in the peripheral vision. These are caused by the changing fields interacting with the retina. They are not harmful but may be irritating. The perception disappears when the EMF exposure has ceased.
3. Importantly, all these effects show a threshold below which there is no risk, and exposures below the threshold are not cumulative i.e. it does not get worse over time through additional exposures.
4. The established adverse effects of EMFs on the body are:
 - at low frequencies (i.e. up to 10 MHz) the effects are on the nervous system and (below 1 Hz) the heart;
 - at high frequencies (i.e. 100 kHz and above) there are heating effects on the whole body or parts of it; and
 - at intermediate frequencies (i.e. 100 kHz – 10 MHz) both nervous system effects and heating effects can occur.
 - In addition, while living tissues are largely unaffected by static magnetic fields, movement in strong magnetic fields will induce (extremely low frequency) electric fields in the exposed person which can lead to a metallic taste, or feelings of vertigo or nausea. The latter effects could lead to safety issues, if the affected worker is in a situation where the adverse effects could increase the likelihood of an accident.
 - There is also risk of electric shock or a burn from touching ungrounded conducting objects in an electromagnetic field.

5. These concepts are illustrated in **Figure 1**

Figure 1



Indirect effects

6. Not only may the EMFs interact directly with people, but also with objects, which may then present an indirect risk to people making contact with them or in the vicinity.
7. Potential indirect effects are:
 - where the external environmental field interacts with a ferromagnetic object, e.g. an implanted or body-worn active medical device (e.g. cardiac pacemaker or insulin pump) when in certain electromagnetic fields, this may cause a malfunction, or the equipment to operate in a different way than was intended or harm the wearer;
 - interference with passive implants (artificial joints, pins, wires or plates made of metal) and effects on shrapnel, body piercings, tattoos and body art where:
 - an external EMF effects a plate or pin causing it to heat by induction;
 - the external magnetic field causes a piece of shrapnel or a passive implant (e.g. a stent or clip) to move, causing internal injury to the worker;
 - unintentional initiation of detonators that can cause explosions, e.g. in places such as quarries or ammunition factories and stores;
 - creation of incendive sparks that ignite flammable atmospheres causing fires or explosions;
 - electric shocks or burns from touching conductive objects in an electromagnetic field where one of them is grounded while the other one is not; and
 - there are also risks from flying metallic objects in a strong magnetic field.
8. For more details of the fields and frequency changes and their effects please refer to Annex 2.

Annex 2 Field and frequency ranges and their effects

Field & frequency range	Effects	Examples of activities & equipment
Static electric & static magnetic fields 0 – 1 Hz	Indirect effects: Uncontrolled attraction of ferromagnetic metals ie the risk of injury from objects in a large static magnetic field being attracted to magnets in the workplace and flying towards them. Sensory effects: Nausea, vertigo, metallic taste in the mouth, flickering sensations (magnetophosphenes) in peripheral vision. Health effects: Micro shocks.	MRI scanners (Main magnet) Electrochemical processes, e.g. industrial electrolysis, aluminium extraction Nuclear magnetic resonance Spectrometers Electro–magnetic lifting cranes Electric vehicles (cars, underground trains)
Low frequency magnetic & electric fields 1 Hz – 10 MHz	Indirect effects: Interference with active or passive implanted or body-worn medical devices, electric shocks Sensory effects: Flickering sensations (magnetophosphenes) in peripheral vision. Health effects: Nerve stimulation, effects on the central & peripheral nervous system of the body. Tingling, muscle contraction, heart arrhythmia. Contact currents caused by a person touching a conductive object in an EMF where one of them is grounded and the other is not which can result in shocks or burns.	High voltage power lines; Production and distribution of electricity; Welding (arc & spot) Electrical arc furnaces Industrial induction heating (eg large coils used around the site of a weld) AM & FM radio Electric hand-held tools Electric vehicles (cars, trains, trams, metros) MRI (switched gradient fields)
High frequency fields: 100 kHz - 300 GHz	Indirect effects: Interference with active or passive implanted or body worn medical devices, electric shocks, causing electro-explosive devices to initiate, ie when used in close proximity to explosives that have an electrical means of initiation. Sparks caused by induced fields triggering fires or explosions where flammable fuels, vapours or gases are present. Sensory effects: Auditory effects such as perception of clicks or buzzing caused by pulsed radar systems. Health effects: Thermal stress; heating effects leading to a rise in core body temperature or localised limb heating (eg knees or ankles). Contact with charged conducting bodies can lead to RF shock or deep tissue burns.	MRI (RF coils) Broadcasting & TV antennas Radar & radio transmitters Diathermy Dielectric heating (eg vulcanising, plastics welding or microwave drying) Anti-theft systems
Intermediate frequency fields 100kHz – 10 MHz	Effects of both high & low frequencies can be experienced as detailed above.	Surgical diathermy Broadcasting systems & devices (AM radio) Anti-theft devices Military & research radiofrequency systems

Annex 3 - The specific values: Action Levels and Exposure Limit Values

1. **Action Levels (ALs)** are levels related to the direct effects of exposure to EMFs that can be used to demonstrate that exposure levels are below particular exposure limit values (ELVs). ALs are external quantities, whereas ELVs relate to exposure of EMFs in the body. This makes the former easier to assess (and, if necessary, cheaper to measure) than the latter.
2. If the dutyholder can establish that the fields to which workers may be exposed do not exceed the ALs, they can be certain that the corresponding ELVs for those fields will not be exceeded either. In such cases, all that is left for the dutyholder to do is to ensure that there are no safety risks arising from the indirect effects, which is already a requirement of the current regulations.
3. **The Exposure Limit Values (ELVs)** for health and sensory effects detailed in the Directive are values founded on scientifically well-established short-term and acute direct internal effects on the human body caused by the body being in an EMF.
4. Health effects ELVs are used to prevent possible harm from the thermal effects and electrical stimulation of tissue caused by EMFs. If exposure to EMFs is below the ELVs, most workers, except workers at particular risk, will be protected against any adverse effects.
5. ELVs should not generally be exceeded but the Directive and therefore the Regulations allow an exemption from these levels in specific circumstances and for as long as specific certain conditions are met.

Annex 4 – Examples of EMF sources on ships

Equipment on ships which may result in EMF exposures at or above AL

Equipment carried which emits EMF	Levels of EMF	AL likely to be exceeded	Comment
Television		No	Standards for domestic equipment well below AL
Computer and control equipment (VDU screens)		No	Standards for domestic equipment well below AL
VHF Radio (fixed and hand held) MF, UHF radio for internal comms	30MHz - 300MHz High frequency	No	Distance of workers from source or limited time of exposure Hand held – possible impacts for workers at particular risk Possible interference with AIMD to be considered.
Radar – S band	2-4 GHz –High frequency	Unlikely	Distance of workers from source or limited time of exposure Pulsed signal reduces exposure
Radar – X band	8 – 12 GHz – High frequency		
Satellite Communication Equipment	4 – 8 GHz High Frequency : thermal effects	Unlikely	Distance of workers from source
Hand-held electric tools	1Hz to 10MHz – Low frequency	Yes, some tools exceed AL for user	Limited periods of use limits exposure to safe levels Possible interference with AIMD to be considered.
Generator (220 V AC to 440 v AC both in the range 50 to 60 Hz.), associated motors, (Larger vessels fitted with larger 440 V AC 50-60Hz alternator sets, a greater number of motors)	50 to 60Hz – Low frequency	Yes – at close range Yes – at close range	Effects decrease rapidly with distance QinetiC study showed normal working procedures protected workers from exposure at harmful levels.
Generator - electricity up to 6000 V AC with associated motors Some vessels also have Diesel Electric Propulsion Systems generating at 6000V or greater with speed control achieved by variation of excitation			Possible interference with AIMD to be considered.