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Shipping Guidance Notice – 160
Electromagnetic fields (EMF) in workplaces on ships
UK Maritime & Coastguard Agency – Marine Guidance Note MGN 559 (M+F)
(To be read in conjunction with MLN – 017(b) (as amended)

To: MLC Shipowners, Operators, and Masters

1. References

- Maritime & Coastguard Agency – Marine Guidance Note MGN 559 (M+F) (as amended)
- Gibraltar Merchant Shipping (Maritime Labour Convention) Regulations 2013
- Maritime Labour Convention 2006 Regulation 4.3 / Standard A4.3
- Maritime Labour Notice (MLN) – 017(b) - Health and Safety Policies and Programs

2. Summary

The purpose of this Shipping Guidance Notice (SGN) is to bring to the attention of MLC shipowners, operators, and Masters of Gibraltar registered vessels, the United Kingdom Maritime & Coastguard Agency's, Marine Guidance Note MGN 559 (M+F) *(amendment 2 at the time of publication of this SGN).*

Maritime Labour requirements place responsibilities on both member states and MLC shipowners in respect of occupational health protection as part of managing the overall health and safety of the vessel.

MGN 559 (M+F) centres on the potential exposure of workers and seafarers to electromagnetic fields (EMFs) with reference to the action levels (ALs) and exposure limit values (ELVs), and provides guidance to MLC shipowners, on managing the associated risks.

3. Application

The Gibraltar Maritime Administration endorses the use of the guidance contained within MGN 559 (M+F) (as amended) by MLC shipowners as part of risk assessments and the development of any subsidiary mitigating measures in respect of EMF exposures to workers and seafarers on Gibraltar registered vessels.

The exception in respect of MGN 559 (M+F), is that any associated mandatory legislative requirements would be in respect of Gibraltar regulations and requirements as opposed to the references to the United Kingdom's as contained within MGN 559 (M+F).

4. Enclosures

MGN 559 (M+F) Amendment 2 is appended to this SGN, and additionally available via; MGN 559 (M+F) Amendment 2

Steve Gomez - Chief Surveyor
For & on behalf of the Maritime Administrator

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Maritime & Coastguard Agency

MARINE GUIDANCE NOTE

MGN 559 (M+F) Amendment 2 Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Electromagnetic Fields) Regulations 2016

Notice to all shipowners, employers, masters, seafarers, skippers and crew of fishing vessels.

This notice should be read with the Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Electromagnetic Fields) Regulations 2016 and replaces MGN 559 (M+F) Amendment 1.

Summary

This notice provides guidance on the Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Electromagnetic Fields) Regulations 2016.

As part of managing the health and safety of the ship, the employer and shipowner must control the risks in the workplace under the Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997 ("the general duties regulations").

This involves thinking about what might cause harm to people and taking reasonable steps to prevent harm – including considering any risks arising from exposure to electromagnetic fields (EMFs).

In addition, the Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Electromagnetic Fields) Regulations 2016 require the assessment of the potential exposure of workers and seafarers to EMFs with reference to the action levels (ALs) and exposure limit values (ELVs)

If, exceptionally, EMF levels are not already at safe levels, action will be required to address the risks.

Exemptions may be available where current best practice is applied but cannot reduce the sensory effects below the ELVs.

It should be noted that references in this guidance to employers include shipowners, and references to workers also include seafarers (whether or not they are employers or workers) unless otherwise stated.

Amendment 2 updates references only.

1. Introduction

1.1 This guidance sets out what employers need to do to comply with the Merchant Shipping and Fishing Vessels (Health and Safety at Work) (Electromagnetic Fields) Regulations 2016 ("the regulations").

1.2 This guidance contains information to help employers to:

- identify sources of electromagnetic fields (EMF) in workplaces on ships
- assess the exposure of workers to EMF in the workplace
- decide what, if anything they may need to do to protect workers from the risk arising from exposure to EMF
- assess and control any risks from EMFs
- apply for an exemption from certain aspects of the regulations.

1.3 It will also be useful to safety officers and safety representatives ("safety officials") and others with responsibility for health and safety.

1.4 Whilst employers will now have to assess workers' exposure to EMFs, the majority will not need to take any additional action to reduce the risk from EMF. This is because either the levels of EMF are already at safe levels, or where workers may be exposed to higher levels of EMFs, employers will already have assessed and are already managing the associated risks under their duties under the general duties regulations.

1.5 In common with other health and safety regulations, the regulations do not apply to work activities where:

- a ship is being used in the course of public service activities or activities for the purposes of civil protection services, and
- characteristics peculiar to those activities inevitably conflict with a provision of those regulations to the extent that the particular provision conflicts with the activities in question. In such circumstances, the employer remains under a duty to ensure, so far as is reasonably practicable, the health and safety of the workers who are subject or are potentially subject to exposure on the ship.

2. Background

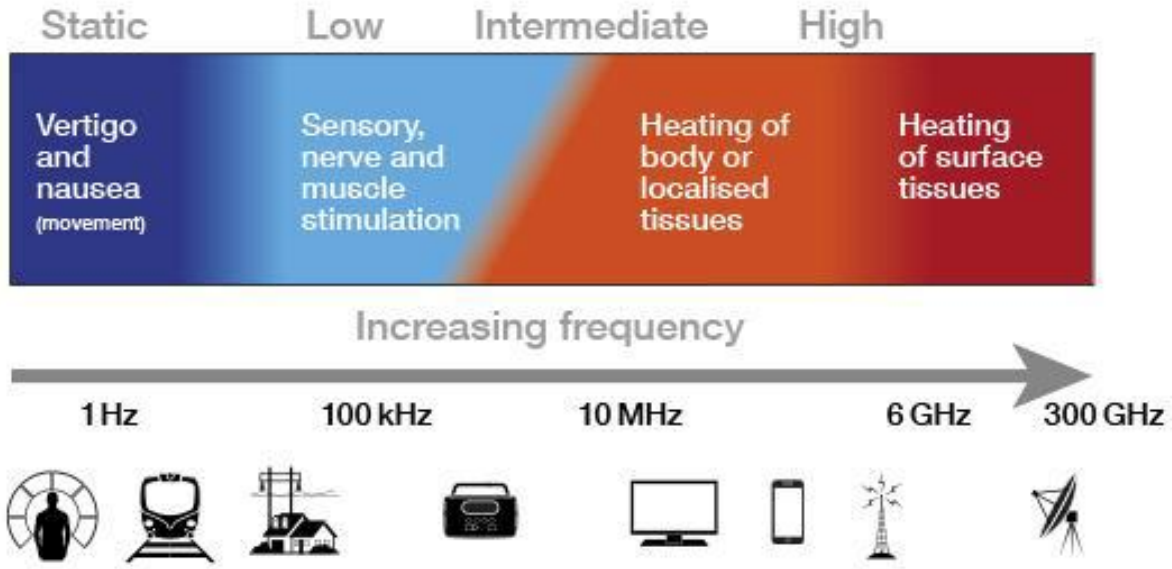
2.1 What is an electromagnetic field (EMF)?

- An EMF is produced whenever a piece of electrical or electronic equipment (i.e. generator, power tools, hand-held radio, TV) is used.
- EMFs are static electric, static magnetic and time-varying electric, magnetic and electromagnetic (radio wave) fields with frequencies up to 300GHz.
- EMFs are present in virtually all workplaces and if they are of a high enough intensity, employers may need to take action to ensure that workers are protected from any adverse effects.

2.2 What are the effects of exposure?

- EMFs at different frequencies affect the human body in different ways causing sensory and health effects. Indirect effects can also occur which are caused by the presence of an object in an EMF which may become the cause of a health and safety hazard.

Effects at different EMF frequencies



Exposure to high levels of EMF can give rise to effects that may be irritating of unpleasant. The effects in a particular case depend on the frequency range and intensity of the EMFs to which a worker is exposed.

• The following field and frequency ranges listed, provides examples of effects which may be produced by work activities and equipment in the different frequency ranges; in most cases, it will only be the highest power instances that may lead to effects being experienced.

Field and frequency ranges

a) Static electric and static magnetic fields 0-1Hz

Effects:

- Indirect effects - uncontrolled attraction of ferromagnetic metals i.e. the risk of injury from objects in a large static magnetic field being attracted to magnets in the workplace and hitting anyone in the way.
- Sensory effects - nausea, vertigo, metallic taste in the mouth, flickering sensations (magnetophosphenes) in peripheral vision.
- Health effects - micro shocks.

Examples of activities and equipment:

- MRI scanners (Main magnet) Electrochemical processes e.g. Industrial electrolysis, aluminium extraction.
- Nuclear magnetic resonance
- Spectrometers
- Electro–magnetic lifting cranes
- Electric vehicles

b) Low frequency magnetic and electric fields 1 Hz – 10 MHZ

Effects:

- Indirect effects - interference with active or passive implanted or body worn medical devices (more information is provided later in this guidance), electric shocks.
- Sensory effects - nausea, vertigo, metallic taste in the mouth, flickering sensations, (magnetophosphenes).

- 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.

Examples of activities and equipment:

- High voltage power lines; production and distribution of electricity
- Welding (arc & spot)
- Electrical arc furnaces
- Industrial induction heating (e.g. large coils used around the site of a weld)
- AM radio
- Electric hand-held tools
- Electric vehicles
- MRI (switched gradient fields)
- Radio transmitters and antennae (eg GMDSS MF/HF)

c) Intermediate frequency fields 100kHz – 10 MHz

Effects:

- The health effects of both high & low frequencies can be experienced as detailed above and below.

Examples of activities and equipment:

- Surgical diathermy
- Broadcasting systems and devices (AM radio)
- Anti-theft devices
- Military and research
- Radiofrequency systems

d) High frequency Fields 100 kHz – 300 GHz

Effects:

- Indirect effects - interference with active or passive implanted or body worn medical devices (more information is provided later in this guidance), electric shocks, causing electro-explosive devices to initiate, i.e. 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 gasses 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 (e.g. knees or ankles). Contact with charged conducting bodies can lead to RF shock or deep tissue burns.

Examples of activities and equipment:

- MRI (RF coils)
- Broadcasting antennas
- Radar (eg primary and secondary navigation radar)
- Radio transmitters and antennae (eg GMDSS VHF, UHF for on-board communications, satellite communications)
- Diathermy
- Dielectric heating (e.g. vulcanising, plastics welding or microwave drying)
- Anti-theft systems

3. What the law says

3.1 The regulations require employers to;

- Access the levels of EMFs to which workers may be exposed
- Ensure that exposure is below a set of exposure limit values (ELVs); (see section 5)
- When appropriate, devise and implement an action plan to ensure compliance with the exposure limits;
- When appropriate, assess the risks of the workers' exposure and eliminate or minimise those risks. The risk assessment must take into account employees at particular risk, such as expectant mothers and anyone with active or passive implanted or body worn medical devices; (see section 10)
- Provide information and training on particular risks (if any) posed to workers by EMFs in the workplace and details of any action being taken to remove or control them. This information should also be made available to safety officials as appropriate; and
- Take appropriate action when workers are exposed to EMFs in excess of the ELVs.

3.2 Employers must also provide health surveillance for their employees as appropriate.

3.3 The regulations contain a schedule which introduces limits, explains the effects of EMFs and provides details of safety conditions which must be met.

3.4 The regulations allow for the sensory-effect ELVs to be exceeded when certain safety conditions are met. In addition, there is provision for exemptions to the exposure limits in certain circumstances. (see section 11)

3.5 These duties are in addition to employers' duties under the general duties regulations to manage all hazards in the workplace, including any from EMFs, through:

3.6 Ensuring the health and safety of workers as far as is reasonably practicable;

- Risk assessment
- Adoption of proportionate control measures
- Consultation with workers
- Co-operating and co-ordinating with other employers to ensure the safety of all on the ship.

3.7 Guidance on formal consultation procedures on ships is in Chapter 13 of the Code of Safe Working Practices for Merchant Seafarers, but consultation on safety issues should extend beyond formal arrangements – see also for example sections 1.2.2 and 2.9 of the Code.

3.8 The employer is also required to ensure that they have a competent person available to provide protective and preventive services to ensure that they comply with health and safety regulations (regulation 14 of the general duties regulations), In most cases therefore employers will not need to take any action to reduce the risks from EMF as the risks will have been identified and appropriate measures taken under the general duties regulations.

4. EMFs in the workplace

4.1 Many sources of EMF in the workplace produce such low levels of EMFs that it is likely, other than assessing exposure to EMFs, no more needs to be done to meet the requirements of the regulations, as the procedures already in place will be sufficient to make sure workers are protected from any risk.

4.2 Annex A (1) to this guidance gives examples of low exposure equipment. Where a worker's workplace only contains equipment on this list, the ELVs and ALs will not be exceeded and, other than keeping a record of the exposure assessment, where applicable (see section 7),

no further action will be needed under the regulations. But where there are employees at particular risk, see section 10.

4.3 In respect of the workers exposed only to such equipment, updating the risk assessment made to comply with the general duties regulations in this way will meet the requirement of regulation 6 to make a suitable and sufficient assessment of electromagnetic fields to which workers may be exposed.

4.4 Annex A (2) contains examples of equipment where EMFs may exceed ELVs and so may pose a risk to workers. For workers who use/are exposed at work to equipment of the type on this list, employers must consult the information available about that equipment to help in the assessment of whether exposure may exceed ELVs (see section 7).

5. Action Levels (ALs) and exposure limit values (ELVs)

5.1 The requirements in the regulations are based on two sets of values related to EMFs: action levels (ALs) and exposure limit values (ELVs). These are based on the recommendations of the International Commission on Non-Ionizing Radiation Protection (ICNIRP).

5.2 ELVs are the legal limitations on the exposure of workers to EMFs, and primarily relate to the levels of exposure to EMFs within the body. These are often impossible or difficult and expensive to measure directly. For this reason a separate set of values, known as ALs, has been produced, which can be measured more easily.

5.3 Action Levels (ALs)

5.3.1 ALs have two main purposes

- Certain ALs may be used to demonstrate that EMF levels are below particular ELVs

If the AL is not exceeded, exposure cannot exceed the corresponding ELV.

If the AL is exceeded, further consideration and assessment is required to determine whether the corresponding ELV may be exceeded. It is still possible, and it is often the case, that the corresponding ELV will not be exceeded.

Simple measures to reduce exposure may be the easiest way to ensure that exposure is beneath the relevant ELV, e.g. by moving the worker further away from the EMF source, or by installing screening (see section 8)

- Indirect-effect ALs are not tied to a particular ELV; instead they detail the EMF levels above which particular indirect effects may take place, such as interference with pacemakers, or the risk of ferromagnetic objects becoming projectiles in the vicinity of strong magnets.

The indirect-effect ALs are the Low ALs in table AL1, and the ALs in tables AL5 to AL7 in the schedule to the regulations.

5.3.2 These ALs do not cover every possible indirect effect. Where workers are exposed to activities where particular indirect effects are a realistic possibility, for example work with electro-explosive devices which may be susceptible to initiation in areas with higher EMF levels, employers should have already identified the risks and put in place measures to ensure safety following risk assessment under the general duties regulations. Workers at risk of such indirect effects are considered “employees at particular risk” – see section 10.

5.3.3 Further information on ALs can be found in the schedule to the regulations.

5.4 Exposure limit values (ELVs)

5.4.1 ELVs are limits specified to protect workers from the health and sensory effects of EMFs. Health effect of ELVs are issued to prevent harm from the heating of tissue and electrical stimulation of nerve and tissue caused by exposure to EMFs. Sensory effect ELVs are used to prevent effects such as magnetophosphenes (a flickering sensation), or a feeling of nausea, vertigo or a metallic taste caused by static magnetic fields.

5.4.2 Annex A (1) provides a list of equipment where it is unlikely that workers will be exposed to EMFs in excess of any AL or ELV; and

5.4.3 Annex A (2) and (3) provide lists of equipment which may exceed particular ALs or ELVs, and may need a more detailed assessment of exposure.

6. Exceeding the ELVs (regulation 5)

6.1 In certain circumstances the ELVs can be exceeded:

- Workers may be exposed to EMFs in excess of the sensory effects ELVs provided that safety measures stated in the Schedule to the regulations are met.

6.2 The employer is not required to produce an exposure action plan, or to carry out any further risk assessment unless exposure exceeds any of the indirect-effect ALs or there are employees at particular risk. Where any sensory effects are reported, the risk assessment must be updated as necessary.

- MCA may exempt specific work activities from the exposure limits stated in the regulations. Any exemption is subject to the employer meeting safety conditions.

6.3 More information on exemptions is provided later in section 11.

7. EMF Exposure assessment (regulation 6)

7.1 The employer must determine whether or not the exposure of workers to EMFs excludes the ELVs. This may be done by assessing exposure against the ALs.

7.2 Available information

7.2.1 The employer's assessment may take into account information already available, for example:

- information in this guidance (in particular Annex A (C1) to (C3))
- evidence from workplace records, e.g. records of any ill-health effects experienced by workers;
- emission information and other safety related data provided by the manufacturer or distributor of equipment used or fitted on the ship;
- sector or industry standards and guidelines, if available;
- the EC's *Non-binding guide to good practice for implementing Directive 2013/35/EU Electromagnetic Fields;* (see section 17)
- information provided by trade associations and other industry bodies; and
- medicines healthcare products regulatory agency (MHRA) guidance (see section 17)

7.2.2 Arrangements for consultation with workers under the general duties regulations may also have yielded information relevant for this purpose.

7.2.3 Regulation 13 of the general duties regulations require the company to coordinate other employers to ensure the health and safety of workers. Where a work activity is not under the control of the employer but may affect workers on board, information should be shared. For example, contractors working on the ship should share information on any exposure of workers that may result from their activity, and the precautions to be taken.

7.2.4 In addition, workers also have duties to undertake work activities safely and inform the master, the safety officer or their employment, of any work situation which could pose a serious and immediate danger to health and safety.

7.2.5 To demonstrate compliance with the ELVs, the information from the EMF exposure assessment should be compared to the information for the appropriate AL.

7.3 Measuring exposure levels;

7.3.1 In most cases, enough relevant information should be available from the sources discussed above to prepare a suitable and sufficient assessment of EMF levels. For many ships, consulting Annex A may be enough to demonstrate that exposure does not exceed any ELV.

7.3.2 Employers can allow the sensory effects ELVs to be exceeded where the safety measures in the schedule to the regulations are met. Measurements or calculations should only be needed for those employers where no exemption applies and the information available is insufficient to determine that the health effect ELVs are not exceeded. (There is no need to measure or calculate in respect of any work activity which is exempted from the exposure limits).

7.3.3 If the exposure assessment shows that workers may be exposed to EMFs in excess of ELVs, MCA may be able to exempt the work activity provided that:

- workers are kept safe during the work activity; and
- it would be difficult to reduce exposure below the ELVs

7.3.4 See section 11 on Exemptions.

7.4 Record keeping;

7.4.1 If the employer has five or more employees, a record must be kept of:

- the significant findings from the most recent exposure assessment; and where required
- the most recent action plan; and
- the significant findings for the most recent risk assessment.

7.5 Review of exposure assessment;

7.5.1 The exposure assessment must be reviewed if:

- there is reason to suspect it is no longer valid; or
- there has been a significant change in the matters to which it relates.

7.5.2 In such cases, the assessment must be updated to ensure it remains “suitable and sufficient”.

8. Controlling risks (regulation 8)

8.1 The employer must devise and produce an action plan to ensure compliance with the ELVs unless:

- the exposure assessment shows that the ELVs are not exceeded; or
- the sensory ELVs are exceeded, but this occurs only during any work activity where the safety measures referred to in the schedule to the regulations apply (see section 6); or
- an exemption applies (see section 11)

8.2 An action plan, if required, must include consideration of:

- other working methods that entail less exposure to EMF;
- the choice of equipment emitting less intense EMF, taking account of the work to be done;
- technical and/or organisational measures that limit the duration and/or intensity of emission of EMF, including where necessary, the use of interlocks, screening or similar health protection mechanisms.

In many situations ELVs may only be exceeded where the worker is close to the EMF source; this can be easily remedied by moving the person further away from the EMF source or by installing screening (N.B. screening many not be effective for low-frequency work activities)

- the use of signage, access controls and floor markings;

If areas are already suitably restricted for other reasons, or cannot be entered accidently, and if workers in the areas are informed of the risks arising from EMF exposure, signs may not be required.

- exposure to electric fields, measures and procedures to manage spark discharges and contact currents through technical means and through the training of workers
- appropriate maintenance of equipment and design of workplaces and when replacing or hiring equipment, consider selecting equipment which emits lower levels of EMFs
- providing personal protective equipment e.g. insulating shoes, gloves, and other protective clothing, where appropriate.

8.3 The employer should consult safety officials or, where not safety officials are in place, their workers or their representatives when deciding risk control measures.

8.4 No formal action plan is needed if a work activity is subject to an exemption.

However, the employer is still required to reduce exposure as far as reasonably practicable.

9. Risk assessment (regulation 9)

9.1 Where the exposure assessment demonstrates that:

- the ELV may be exceeded (even when this is permitted, for example by a derogation or exemption); and/or
- indirect effects ALs are exceeded; and/or
- there are employees at particular risk, the employer must carry out a risk assessment or any risks to workers from EMF exposure.

9.2 The risk assessment must include consideration of the following factors, where relevant:

- the frequency of the ELVs and the level, duration and type of exposure, including the distribution over the workers body and the variations between areas in the workplace
- direct effects
- indirect effects
- employees at particular risk (See section 10)
- simultaneous exposure to multiple frequency fields
- multiple sources of exposure
- information available from the manufacturer of relevant equipment
- information obtained from any health surveillance undertaken
- the existence of replacement equipment designed to reduce the level of exposure to electromagnetic fields
- other health and safety related information.

9.3 The risk assessment should record the significant findings and details of any groups of workers identified by it as being especially at risk. The risk assessment should be reviewed at

suitable intervals e.g. if working practices change, equipment is being replaced or there have been any other significant changes such as appointment of new workers who may be at particular risk, or if any adverse effects are reported by employees. General guidance on risk assessment is contained in Chapter 1 of the Code of Safe Working Practices for Merchant Seafarers.

10. Employees at particular risk

10.1 Employees at particular risk means those who have declared to their employer a condition which may lead to higher susceptibility to the potential effects of exposure to EMFs.

This includes:

- expectant mothers
- workers who have declared the use of active implanted medical devices (AIMDs), passive implanted medical devices (PIMD) and body worn medical devices (BWMD)
- workers who work in close proximity to electro-explosive devices, explosive materials or flammable atmospheres.

10.2 Examples of devices and implants are provided in section 10.2. More information is available in the non-binding guide to good practice for implementing Directive 2013/35/EU: Electromagnetic fields.

10.3 Employees at particular risk may not necessarily be at greater risk than other workers on the ship, but any specific additional risks must be identified and addressed if found.

10.4 Using the information in this guidance and available elsewhere on controlling risks, the details of any significant findings from the risk assessment should be recorded together with any controls put in place to minimise the risks as appropriate.

10.5 Expectant mothers

10.5.1 As working with certain levels of EMFs could result in a greater risk to an expectant mother, the employer should encourage workers to notify them in writing if they become pregnant. A practical approach is to limit the exposure of expectant mothers to the public exposure limits. These are stated in Council Recommendation 1999/519/EC.

10.5.2 Annex A (C1) contains a non-exhaustive list of examples of workplaces and equipment to consider in respect of expectant mothers. These must be considered in addition to the information contained in Annex A (1).

10.5.3 If risks to a worker are identified during pregnancy, the employer must take appropriate action to eliminate reduce or control the risks. They must be included and managed as part of the general workplace risk assessment.

10.5.4 More information on “risks to new and expectant mothers” see MSN 1890 (M+F) amendment 4, health and safety new and expectant mothers.

10.6 Active implanted medical devices (AIMDs), passive implanted medical devices (PIMD) and body worn medical devices (BWMD)

10.6.1 Some levels of EMFs could cause devices to malfunction or workers to receive injuries as a result of EMFs interfacing with them. For example, very strong static magnetic fields could create turning forces that move ferromagnetic PIMDs and intermediate frequencies may cause them to heat up, which may lead to injury to the surrounding tissues.

10.6.2 Examples of these devices are;

- **PIMDs:** orthopaedic implants or joints, pins, or screws and metallic contraceptive implants
- **AIMDs:** cardiac pacemakers, implanted drug infusion pumps and cochlear implants
- **BWMDs:** insulin pumps and hearing aids.

10.6.3 The employer should encourage workers to consider the information in this guidance and advise their employer if they may be affected. If they have implants or devices fitted, they should obtain information/instructions from the manufacturer of the medical device. If the device is implanted, they should also obtain advice from the medical professional who completed the implant procedure.

10.6.4 If no specific information is available, a practical approach is to limit the exposure of workers with such devices to the public exposure limits. These are stated in Council Recommendation 1999/519/EC.

10.6.5 When conducting a risk assessment for workers with metallic PIMDs, the following factors should be considered;

- metallic PIMDs may warm up exposed to time-varying EMFs. If the heating is sufficient, it can cause damage to the surrounding tissue, if the implant is less than 20mm in size, it can be assumed that heating effects will be minimal;
- some passive implants may contain ferromagnetic material which can be affected by static magnetic fields. Workers with implants containing ferromagnetic materials should not be exposed to static magnetic flux densities exceeding 3 millitesla (mT)

10.6.6 For more information on the procedures for the assessment of the exposure to EMFs of workers who have AIMDs (including the specific assessment for workers with cardiac pacemakers) see BS EN 50527.10.11.

10.6.7 Annex A (C2) and (C3) contain examples of sources of EMF which should be considered in addition to the information in Annex A (2) on sources of EMF where exposure of employees to EMF levels is at levels which may pose a risk.

11. Exemption

11.1 MCA may exempt work activities from the exposure limits stated in the regulations, provided that workers are nevertheless protected from the risk of harm from EMFs. An exemption would only be required where ELVs are, or are likely to be, exceeded.

11.2 If the work activity is exempt, the employer will not have to comply with the exposure limits in respect of that activity, but they will have to meet the exemption conditions.

These include:

- ensuring that exposure is as low as reasonably practicable; and
- ensuring that workers are protected against the health effects and safety risks posed by that exposure

11.3 In considering whether exposure is as low as reasonably practicable, the guidance on controlling the risk (section 8 above) may be helpful.

11.4 An exemption does not affect the employer's other responsibilities under the regulations, such as undertaking a risk assessment and providing suitable information and training. However, the employer will not be required to use measurements or calculations in their exposure assessment. This is because such measurements etc., are only required where it is necessary to demonstrate compliance with the exposure limits.

11.5 The flowchart in Annex C shows how to determine whether an exemption may be applicable.

11.6 The procedure for applying for an exemption is at Annex B.

12. Use of magnetic resonance imaging (MRI) for medical purposes

12.1 The exposure limit requirements do not apply to the installation, maintenance of, or research related to MRI equipment where it is used for patients in the health sector where:

- it is reasonable in the circumstances that the equipment be used
- the exposure of workers is reduced to the lowest level reasonably practicable; and
- workers are protected against the health effects and safety risks arising from their exposure to electromagnetic fields.

12.2 Other requirements of the regulations continue to apply.

12.3 Further information can also be found in the EU (non-binding) Practical Guide on Electromagnetic fields, Appendix F.

13. Use of MRI on ships

13.1 If MRI is used in any circumstances NOT related to the use of MRI equipment for patients in the health sector, where the ELVs are exceeded, this will be considered case by case, to see if it is appropriate to issue an exemption. See section 11 and Annex B.

14. Information and training

14.1 If, through the assessment process risks are identified that need to be managed, the employer must provide relevant information and training for workers who are likely to be subject to those risks (and/or their safety representatives).

14.2 This information should include:

- an explanation of ALs and ELVs
- details of possible undesired health, sensory or indirect effects and what to do if these are experienced
- details of the safe working practices the employer will adopt to eliminate and reduce risks arising from exposure
- an explanation of any safety signage used
- details of appropriate personal protective equipment
- information for employees at particular risk such as expectant mothers and those with active implanted medical devices (AIMDs), passive implanted medical devices (PIMD) or body worn medical devices (BWMD); and
- the circumstances in which they may be entitled to a medical examination and or health surveillance.

15. Health surveillance

15.1 The employer may already consider health surveillance for other hazards in the workplace; this provides an early indication of ill health and helps ensure corrective action is taken.

15.2 Health surveillance for EMF exposure will only be required if a worker is exposed to EMFs above the ELV and reports experiencing an undesired or unexplained health effect which is suspected of being associated with EMF exposure; the employer must then ensure health surveillance and medical examinations are provided as appropriate. As the regulations do not address suggested long-term effects of exposure to EMFs, any health surveillance required should not be burdensome.

15.3 Existing guidance on investigating accidents and health surveillance should be considered and any action taken as required.

15.4 More information on health surveillance is available in chapter 7 of the Code of Safe Working Practices for Merchant Seafarers.

16. Further reading

16.1 There is more information about EMFs and links to other useful documents at HSE Non-Ionising Radiation

16.2 See also:

- Directive (2013/35/EU) on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (electromagnetic fields)

- Non-binding guide to good practice for implementing Directive 2013/35/EU Electromagnetic Fields access the following web-site;
https://op.europa.eu/en/publication-detail/-/publication/c6440d35-8775-11e5-b8b7-01aa75ed71a1

- S.I 1997/2962 Merchant Shipping and Fishing Vessels (Health and Safety at Work) Regulations 1997

- Council Recommendation 1999/519/EC

- The International Commission on Non-Ionizing Radiation Protection (ICNIRP); as an independent organization ICNIRP provides scientific advice and guidance on the health and environmental effects of non-ionizing radiation (NIR). Access their web-site;
https://www.icnirp.org/en/home/index.html

- Research Report 1018 – Electromagnetic Fields (EMF) in the welding environment - Prepared by TWI Ltd for the Health and Safety Executive.

More information

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105 Commercial Road
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Please note that all addresses and telephone numbers are correct at time of publishing.

Annex A(1): Sources of EMG at levels below the ELVs and which will not exceed the indirect effect AIs

N.B. Consideration may still be needed for workers at particular risk - see annex A (C1) to (C3).

Wireless communications

- Phones,(landlines, mobile phones, cordless, Digital Enhanced Cordless Telephone (DECT) base stations) and fax machines in workplaces
- Wireless communications devices (eg Wi-Fi or Bluetooth) including access points for wireless local area network (WLAN) (NB: Special consideration should be given to employees with active implants – see table C3)

Office/Mess/Accommodation

- Audio visual equipment; TVs, DVDs etc.
- Communication equipment and wired networks
- Computer & IT equipment
- Electric fans, fan heaters & room heaters
- Office equipment i.e. photocopiers, printers, shredders etc.
- Household & professional appliances e.g. washing machine/dryer, toaster as long as
- Wireless Local Area Network (WLAN) and Bluetooth are not involved
- Lighting including desk lamps
- Alarm systems
- Electrical room heating equipment

Work equipment/general on board

- Workplaces accessible to the general public which meet the exposure limits for the general public specified in Council Recommendation 1999/519/EC
- Base and fixed radio station antennas outside operator's designated exclusion zone
- Electric handheld and transportable tools
- Coating & painting equipment
- Control equipment not containing radio transmitter
- Measuring equipment & instrumentation not containing radio transmitters
- Hydraulic ramps
- Battery powered portable equipment that do not contain radio frequency transmitters
- Battery chargers, non-inductive-coupling designed for household use
- Equipment placed on the market as compliant with Council Recommendation 1999/519/EC or harmonised EMF standards.

Electrical supply

- Any electrical circuit or installation (including cables, busbars, switchgear and transformers) where the cables carrying the electrical currents are bundled together so that they are always touching or nearly so and there are no unusual earthing arrangements that could create unbalanced currents.
- Any electrical circuit or installation (including cables, busbars, switchgear and transformers) where the cables or busbars carrying the electrical currents are separated, and the rating of the circuit or that part of it is ,100A (equivalent to 23 kW for a single phase 230 V circuit, 69 kW for a three-phase 230 V circuit, or 1.9 MW for a three-phase 11 kV circuit)

Annex A(2) – Sources of EMF which may exceed the ELVs and/or the indirect effect AIs

Electrical supply

- Electrical circuits (including cables, busbars, switchgear and transformers) where the cables carrying the electrical currents are bundled together so that they are always touching or nearly so, but there are earthing arrangements that mean the cables collectively carry an unbalanced current of more than 100 A. (Exposure to magnetic fields)
- Electrical circuits (including cables, busbars, switchgear and transformers) where the cables or busbars carrying the electrical currents are separated and the rating of the circuit or of that part of it more than 100 A (Equivalent to 23 kW for a single-phased 230 V circuit, 69 kW for a three-phase 230 V circuit, or 1.9 MW for a three-phase 11 kV circuit). (Exposure to magnetic fields)

Light industry

- Dielectric heating and welding
- Resistance welding; manual spot and seam welding
- Induction heating
- Induction soldering
- Magnetic particle inspection (crack detection)
- Industrial magnetiser and demagnetisers, e.g. tape erasers
- Microwave heating and drying
- RF Plasma devices including vacuum deposition and spluttering

Heavy industry

- Industrial electrolysis
- Furnaces, arc and induction melting

Medical

- MRI equipment
- Medical diagnostic and treatment equipment using EMFs e.g. diathermy and trans-cranial magnetic stimulation

Navigation equipment on board

- Radar
- Maintenance of radar or high powered communications systems. eg GMDSS MF/HF/VHF installations
- Radio broadcasting systems and devices

Navigation equipment

- Base and fixed radio station antennas, inside operator's designated exclusion zone Radio frequency or microwave energised lighting equipment

Annex A (C1) - Sources of EMF which may pose a risk to expectant mothers workers

Electrical supply

- Where workers need to be in close proximity to cables carrying high currents

Light industry

- Automated induction heating systems, fault-finding and repair involving close proximity to the EMF source.
- Automated welding systems, fault-finding, repair and teaching involving close proximity to the EMF source.

Medical

- MRI equipment

Annex A (C2) - Sources of EMF which may pose a risk to workers with passive implanted medical devices

Electrical supply

- Where workers need to be in close proximity to cables carrying high currents

Light industry

- Automated induction heating systems, fault-finding and repair involving close proximity to the EMF source.
- Hand-held induction heating coils
- Automated welding systems, fault-finding, repair and teaching involving close proximity to the EMF source.

Medical

- MRI equipment

Annex A (C3) - Sources of EMF which may pose a risk to workers with active implanted and active body-worn medical devices (and exceed the AL in the schedule to the regulations, Table AL6)

Wireless communications

- Use of Wi-Fi or Bluetooth including access points for WLAN
- Use of cordless phones, DECT base stations & fax machines
- Use of mobile phones

Office

- Audio visual equipment containing radiofrequency transmitters

Security

- Article surveillance equipment and radio frequency identification
- Tape or hard drive erasers
- Metal detectors

Electrical supply

- Work on generators or emergency generators and where workers need to be in close proximity to cables carrying high currents
- Inverters, including photovoltaic systems

Light industry

- Arc welding processes including MIG, MAG & TIG
- Industrial and large professional battery chargers
- Corona discharge surface treating equipment
- Electrostatic painting equipment
- Use of heat guns
- Use of glue guns
- Use of hand held and portable tools e.g. drills, sanders, circular saws and angle grinders.
- Furnaces resistively heated
- Welding systems – working close to the EMF source; fault finding and teaching
- Automated induction heating systems, fault-finding and repair involving close proximity to the EMF source.
- Automated welding systems, fault-finding, repair and teaching involving close proximity to the EMF source.
- Radio frequency heater/sealer equipment
- Machine tools e.g. pedestal drills, grinders, lathes, milling machines, saws.

Medical

- MRI equipment

Construction

- Construction equipment e.g. working close to concrete mixers, cranes etc.

Transport

- Motor vehicles and plant - working close to starter, alternator and ignition systems in motor vehicles and work places

Miscellaneous

- Battery chargers inductive or proximity-coupling
- Equipment generating static magnetic fields greater than 0.5 millitesla e.g. by magnetic chucks, tables and conveyors, lifting magnets, magnetic brackets, nameplates, badges
- Headphones producing strong magnetic fields
- Professional inductive cooking equipment
- Two way radios e.g. walkie-talkies, vehicle radios
- Battery powered transmitters

Navigation/ communication equipment

- Maintenance of radar or high powered communications systems, eg GMDSS MF/HF/VHF

Annex B - Submitting an Exemption Application

B.1 The application must be made on form MSF 1261 *Assessment of Equivalence to / Exemptions from Statutory Requirements*. Please send the application, together with any additional supporting evidence, and submit this to the nearest MCA Marine Office and copied to Customer Service Manager (if applicable). Section 4 of the application form (area of operation) does not need to be completed.

B.2 An exemption under the regulations must be subject to the following conditions—

(a) the exposure of employees to electromagnetic fields must be reduced to the lowest level reasonably practicable; and

(b) employees must be protected against the health effects and safety risks arising from that exposure.

B.3 Section 6 of the application form will therefore need to include the following information;

1. Nature of the work activity - *an explanation of what activity is carried out and why it is not possible to meet the exposure limits.*

2. Description of equipment - *outlining frequencies, emissions, power levels etc. and what measures are taken regarding equipment and operator positioning and any operator screening.*

3. Description of operating cycles - *providing information on watch-keeping patterns duty - cycles, or the temporary nature of the exposure can support a case for exemption*

4. An account of preventative actions taken - *demonstrating how measures to ensure 'lowest levels reasonably practicable' have been devised and implemented.*

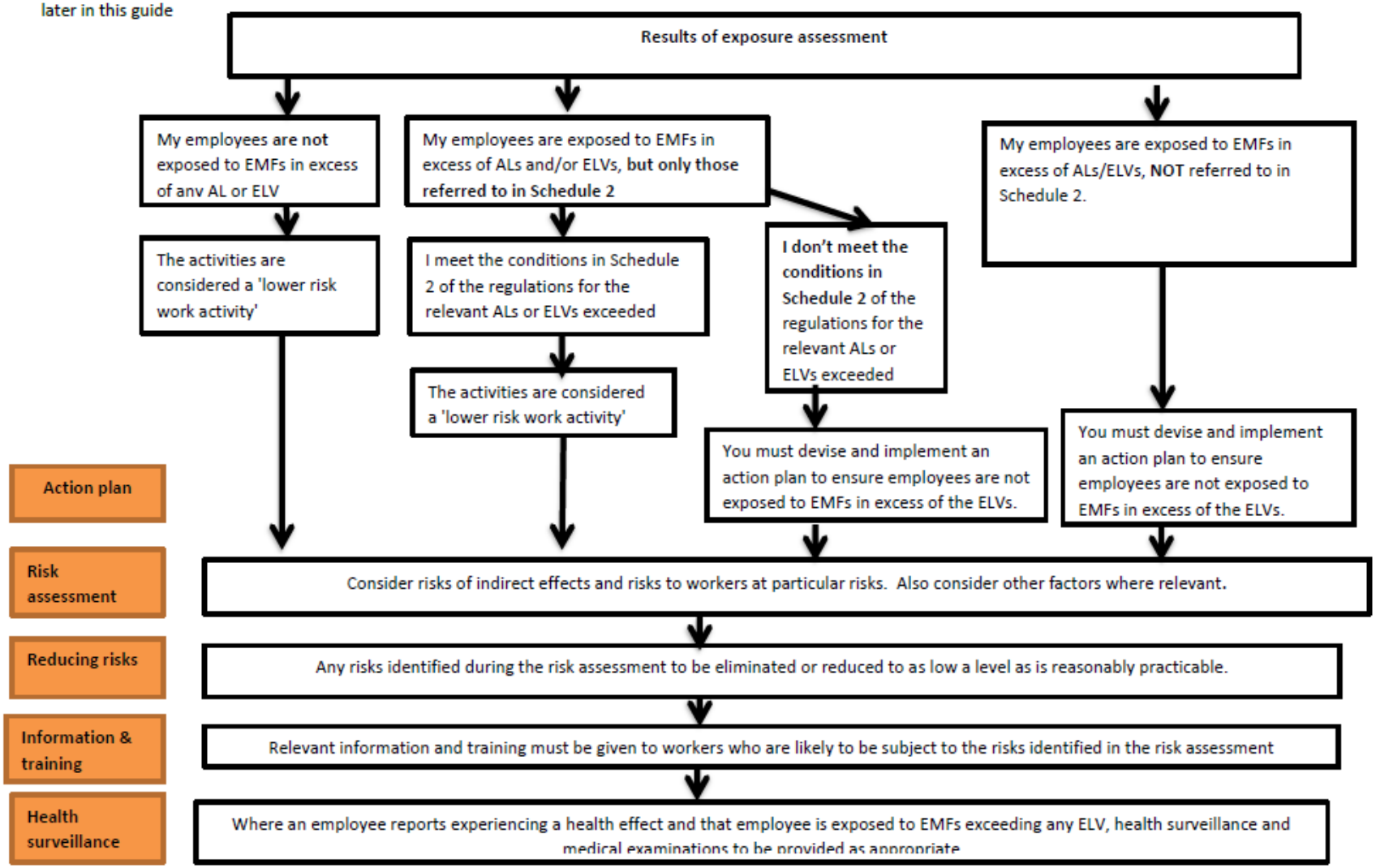
5. Why continuing the work activity is essential to business - *whether commercial or otherwise.*

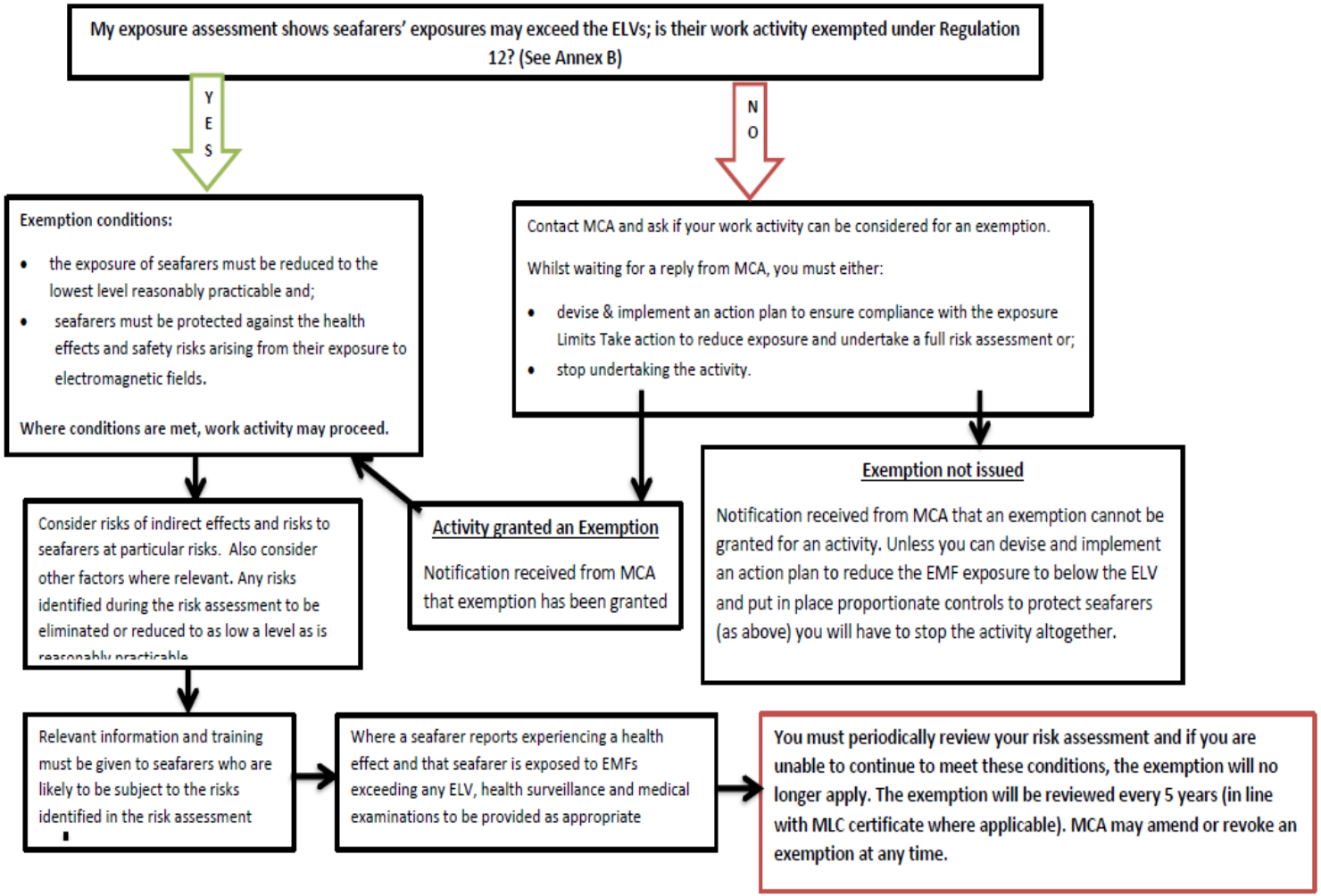
B.4 A copy of the risk assessment produced in compliance with regulation 9 should be included with the application. Information included in the risk assessment does not need to repeated on the form, but should be referenced. (This list is not exhaustive - any additional information considered relevant to the case but not specifically mentioned here should also be submitted.

Exemptions may only be granted for a maximum period of five years, and may be withdrawn by the Secretary of State if he is satisfied that the exemption is no longer justified.

ANNEX B

This flow chart is for work activities in respect of which **no exemption** has been issued from the exposure limits. If your work activity has an exemption, please see the exemption flow chart later in this guide



ANNEX C

Exemption flow chart: