Approved Code of Practice and Guidance

For

The Radiation (Emergency Preparedness and Public Information) Regulations 2019

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Approved Code of Practice

This Code has been approved by the Health and Safety Executive, with the consent of the Secretary of State. It gives practical information on how to comply with the law. If you follow this code you will be doing enough to comply with the law in respect of those specific matters on which the Code gives advice. You may use alternative methods to those set out in the Code in order to comply with the law.

However, the Code has a special legal status. If you are prosecuted for breach of health and safety law, and it is proved that you did not follow the relevant provisions of the Code, you will need to show that you have complied with the law in some other way or a Court will find you at fault.

Guidance

The Regulations and Approved Code of Practice (ACOP) are accompanied by guidance. Following the guidance is not compulsory and you are free to take other action. But if you do follow the guidance you will normally be doing enough to comply with the law. Health and safety inspectors seek to secure compliance with the law and may refer to this guidance as illustrating good practice.

Presentation

The ACOP text is set out in bold, the accompanying guidance is in normal type, and the text of the Regulations is in italics. Coloured borders also indicate each section clearly.

Contents

Introduction

About this Publication

1. This publication has been produced to set out the Regulations, Approved Code of Practice (ACOP) and guidance on the requirements of the Radiation (Emergency Preparedness and Public Information) Regulations 2019 (REPPIR[1]) [1]. These aim to establish a framework for the protection of members of the public and workers from and in the event of radiation emergencies that originate from premises. They also provide advice to those who are involved in planning communication strategies.

2. This publication is intended for use by duty holders; i.e. Persons having legal responsibilities under these Regulations. The format is designed to clearly distinguish between the Regulations, the ACOP and the guidance. It should be read in conjunction with and supplemented by other available guidance including the National Nuclear Emergency Planning and Response Guidance (NNEPRG) [2].

Reasons for change

3. The 2013 Basic Safety Standards Directive [3] (referred to as BSSD in this publication) brings five directives:
    - Basic Safety Standards Directive 96/29/ European Atomic Energy Community (Euratom);
    - Medical Exposures Directive 97/43/Euratom;
    - Outside Workers Directive 90/641/Euratom;
    - Control of high-activity sealed radioactive sources and orphan sources 2003/122/Euratom; and
    - Public Information Directive 89/618/Euratom,

    and an EU commission recommendation (Radon Commission Recommendation 90/143/Euratom) into one Directive. It reflects important lessons learned from the Fukushima Daiichi incident, as well as the recent standards agreed at the International Atomic Energy Agency (IAEA) and International Commission on Radiological Protection (ICRP).

4. The BSSD lays down requirements for protection against the dangers arising from exposure to ionising radiation. The aims of the Directive are to ensure:
    - minimum standards for protection against ionising radiation are introduced across all Member States;
    - dutyholders minimise so far as is reasonably practicable, the risks from ionising radiation to which members of the public and workers may be exposed; and
    - risks from ionising radiation are controlled.

5. On 22nd May 2019, REPPIR replaced the Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR 2001) and is the primary means through which the radiation emergency preparedness and response elements of the BSSD are transposed into UK law.

6. REPPIR is made under the Health and Safety at Work etc. Act 1974 [4] (the 1974 Act).

Changes introduced by REPPIR

7. The significant changes are summarised below and have been widely consulted on. They include:
    - Removal of interpretations, schedules and references associated with transport activities. The Carriage of Dangerous Goods Regulations 2009 [5], as amended in 2019 (CDG) [6], implements the BSSD requirements for emergency arrangements for the transport of radioactive material. However, Regulation 22 relates to emergencies (however they may arise) which includes reference to transport emergencies;
    - Modification of the definition of radiation emergency and removal of reference to ‘radiation accidents’;
    - Introduction of the term emergency worker;
    - Compared to the thresholds in REPPIR 2001, Schedule 1 includes additional radionuclides, revised scenarios and new modelling assumptions. The masses of fissile material in Schedule 2 are derived from

[1] From now on the term REPPIR will be used throughout this document as an abbreviation for REPPIR 2019

their potential to produce a criticality emergency; these values are unchanged from the corresponding Schedule 3 values in REPPIR 2001.

- The previous exemption under REPPIR 2001 Regulation 3(4) (g) (see below) is not included in REPPIR and so these substances must be considered as part of the operator's assessment of applicability:

  (g) the presence of a radioactive substance while it is in or on the live body or corpse of a human being or animal where that presence occurs otherwise than in consequence of a radiation emergency.

- Removal of references to 'reasonably foreseeable' radiation emergency and strengthening of the requirements for operators to assess all hazards arising from work undertaken which have the potential to cause a radiation emergency;
- Introduction of a risk assessment framework and consequence assessment methodology;
- Changes to the requirements for hazard evaluation and consequence assessment;
- A shift of responsibility for determining the detailed emergency planning zone to the local authority;
- Introduction of outline planning zones;
- Introduction of a proportionate and graded approach to planning for radiation emergencies;
- Removal of the requirement to separately determine prior information areas and a shift in the responsibility for the distribution of prior information to the local authority;
- Strengthening of the requirement for all local authorities to have in place arrangements to obtain and supply information to the public in the event of a radiation emergency, including those relating to transport of nuclear or radioactive material;
- Limitation of the disapplication of dose limits to emergency workers;
- Introduction of reference levels; and
- Introduction of the requirement to consult a Radiation Protection Adviser (RPA) on specific matters.

Scope of the revised Regulations

8. Regulation 3 of REPPIR sets out the scope of application of the Regulations. REPPIR places duties on operators and local authorities to plan for and manage the consequences from radiation emergencies arising from work with ionising radiation. These duties are placed on premises on which there is a radioactive substance containing more than the quantity of any radionuclide set out in Schedule 1, or, in the case of fissile material, more than the mass of fissile material in Schedule 2.

9. If radioactive substances are handled and stored, even temporarily, at ports and airports, these places are regarded as premises and REPPIR will apply if sufficient quantities are involved.

10. REPPIR regulation 22 (Duty of local authority to supply information to the public in the event of a radiation emergency) is applicable to ALL local authorities, irrespective of whether there are premises to which REPPIR applies in their area.

11. Regulation 25 of REPPIR (Modifications relating to the Ministry of Defence) allows the Secretary of State for Defence to make exemptions in the interest of national security from all or any of the requirements or prohibitions imposed by REPPIR.

12. Dutyholders under REPPIR 2001 and those who were excluded from REPPIR 2001 may not be excluded from REPPIR as thresholds for quantities of radionuclides and mass of fissile material have, in some instances, reduced. Dutyholders should determine whether REPPIR applies, which regulations they need to comply with and ensure compliance.

13. These Regulations apply in Great Britain. Northern Ireland publishes separate regulations.

14. Throughout the process described in REPPIR of identifying hazards through to developing an emergency plan, accepted international good practice including international standards and guidance should be considered.

15. For a nuclear licensed site regulated under the Nuclear Installations Act 1965 (NIA) [7], some of the requirements of REPPIR are already addressed by existing nuclear site licence conditions (e.g. the licensee implementing the emergency plan is covered by the emergency arrangements). REPPIR will not replace

existing nuclear site licence conditions but compliance with the conditions should satisfy equivalent provisions in REPPIR.

16. There are some direct links between REPPIR and the Ionising Radiations Regulations (the 2017 Regulations [8], for example, regulation 18 of REPPIR on emergency exposures, and regulations 22, 24 and 25 of the 2017 Regulations on dose assessment, dose recording, dosimetry for accidents (or emergencies) and medical surveillance. The terminology used in REPPIR is closely aligned to that in the 2017 Regulations. The 2017 Regulations use the term radiation accident which refers to any accident where immediate action would be required to prevent or reduce the exposure to ionising radiation of employees or any other persons. Radiation emergencies as defined in REPPIR are events relating to serious consequences and are subset of radiation accidents.

17. Emergency arrangements made under REPPIR need to dovetail with those framework arrangements made under the Civil Contingencies Act (CCA) [9]. The CCA provides the overarching framework for civil emergency preparedness and response. REPPIR provides additional requirements for premises with the potential to have a radiation emergency.

18. The provisions in REPPIR have been developed with consideration of provisions in the Control of Major Hazards Regulations 2015 (COMAH) [10] and the Pipelines Safety Regulations 1996 [11] to maximise emergency preparedness consistency between Regulations for major hazards sectors.

Hazard evaluation and consequence assessment

19. Regulation 4 requires the operator to carry out and write a report of an evaluation to identify all hazards from their work with ionising radiation that have the potential to cause a radiation emergency. Guidance is provided on how the hazard evaluation should adopt a cause agnostic approach focusing on the consequences of a radiation emergency and the implications for emergency planning. Having identified these hazards, the operator is then required to make arrangements to prevent any radiation emergency and to limit the consequences of any such emergency that occurs. ACOP (in the form of the REPPIR risk framework) and guidance is provided to assist the operator to identify a full range of radiation emergencies for the purposes of the consequence assessment required under regulation 5.

20. Regulation 5 requires that, where an operator has identified the potential for a radiation emergency pursuant to its evaluation under regulation 4, the operator must make a further assessment to evaluate a full range of consequences of such a radiation emergency.

21. Regulation 6 requires that, where the operator proposes a material change in its work with ionising radiation, or where a material change occurs, the operator must undertake a review of its evaluation in accordance with regulation 4 and either make a further assessment in accordance with regulation 5 or make a declaration that the change of circumstances which triggered the review would not affect the last consequences report.

22. Regulation 7 requires the operator to prepare a consequences report presenting the conclusions of the consequence assessment performed under Regulation 5(1) and to send it to the local authority. The consequence report should include a proposed minimum geographical extent for detailed emergency planning. It also requires the operator to discuss the results of the consequence assessment with the local authority and to provide a copy of the details of the assessment to the regulator. The regulator is the Office for Nuclear Regulation (ONR) for nuclear licensed sites, authorised defence sites, nuclear new build sites and nuclear warship sites and the Health and Safety Executive (HSE) for all other sites.

Emergency planning areas

23. To plan for emergencies, it is necessary to identify the areas for which planning is required. Regulation 8 places a duty on the local authority to determine the detailed emergency planning zone taking into account the operator's proposal and other factors specific to the local authority's area.

24. The determination of outline planning zones on certain sites is set out in Regulation 9. Outline planning supplements detailed planning providing mitigation against very low probability events potentially not considered in the design.

Emergency plans

25. Regulation 10 requires the operator to prepare an adequate emergency plan where the evaluation under regulation 4 shows that a radiation emergency may arise. Regulation 11 requires that, where there is either a detailed emergency planning zone, an outline planning zone, or both, the local authority must prepare an adequate off-site emergency plan to mitigate the consequences of a radiation emergency outside the operator's premises. Regulation 12 makes provision for the review, revision and testing of both the operator's emergency plan and the local authority's off-site emergency plan. The operator's emergency plan and the off-site emergency plan must be reviewed and tested at least once every three years. If any findings that could affect the emergency response are identified during testing or review, which are relevant to the arrangements set out in the emergency plan, the plan must be revised.

26. An emergency plan is a document, or set of documents, that describes roles and responsibilities and may be supplemented by more detailed documents such as detailed event specific guidance. Emergency plans should be produced with the aim of keeping the radiation exposure of workers and members of the public that might occur in events, as low as reasonably practicable. A proportionate and graded approach to planning will ensure that the emergency management system is able to effectively respond to the impact of a wide range of radiation emergencies. The operator's emergency plan and the off-site emergency plan should be complementary and dovetail to provide protection to members of the public for a full range of radiation emergencies.

27. An emergency plan should specify responses for the phases of a radiation emergency. The first few hours after the emergency starts is the 'critical' phase during which the effectiveness of the response can have the greatest effect. This is when key decisions, which will greatly affect the success of any protective action, should be made in a short period of time and when those responsible will be under the most pressure. Therefore, emergency plans should contain detail on the protective action which can be put in place to enable persons with a role in an emergency plan to work in a timely and effective manner. The emergency plans should also specify the action to be taken to ensure a smooth transition to the recovery phase. Planning for recovery should begin at the earliest opportunity following the onset of an emergency and run alongside the response.

28. The operator's emergency plan is the responsibility of the operator and the off-site emergency plan is the responsibility of the lead local authority. As dutyholders, each has the duty to ensure that plans are prepared, and are adequate.

29. Regulation 21 requires the local authority, in cooperation with the operator, to ensure that prior information is provided to the public in the detailed emergency planning zone where appropriate and is accessible to the public in an outline planning zone. Regulation 22 requires information to be provided to the public in the event of an emergency. Regulation 22 applies to all local authorities whether or not they have premises in their area to which REPPIR applies.

Co-operation and consultation

30. Regulation 13 requires the cooperation between the operator and the local authority in fulfilling their duties to prepare emergency plans. There is guidance to assist in ensuring that the off-site plan and the operators plan dovetail with one another. The ACOP and guidance also describes the arrangements that should be agreed, recorded and put in place between the local authority and the operator to ensure that there is communication from the start and throughout the emergency.

31. Regulation 14 requires cooperation where a lead local authority requires assistance from another local authority to make and test its off-site emergency plan if, for example, protective actions are required for persons situated in the area of that other local authority.

32. Regulation 15 requires operators and employers on their premises that work with radioactive material to work together to ensure that the operator can fulfil its duties under the Regulations. Similarly, the regulation requires local authorities and employers with duties under the off-site emergency plan to work together to establish and maintain a suitable and sufficient plan. To do this the regulation puts duties on all such organisations.

33. All organisations with a role in responding to a radiation emergency should be involved, as appropriate, in the preparation of emergency plans. Nominated representatives of these responding organisations should be invited to attend a multi-agency forum or group to develop plans and participate in tests.

34. Regulation 16 provides that a local authority may charge the operator reasonable costs in relation to the off-site emergency plan under Regulations 8, 11, 12 and 21.

35. Regulation 24 requires that every employer engaged with work with ionising radiation must consult a suitable RPA with regard to preparedness and response in emergency exposure situations.

Implementation

36. Regulation 17 sets out when operators and local authorities should implement their emergency plans and who should be informed about that implementation. A radiation emergency begins when the operator declares one. On declaration, the operator informs the local authority of the need to implement the off-site emergency plan. (This could be before any release of radioactive material or irradiation has occurred.) Timely implementation of emergency response is a key factor in determining the outcome of a radiation emergency.

Emergency exposures - Employees

37. Emergency exposures are those exposures incurred by emergency workers, who take action to bring help to endangered people, prevent exposure of a large number of people, and prevent harm to the environment or save valuable property, plant or goods. Such exposures are permitted to exceed statutory dose limits but only for pre-identified authorised employees who have received appropriate information and training and are appropriately equipped.

38. Regulation 18 requires that training and equipment should be provided to employees by their employer where there is the possibility of that employee receiving an emergency exposure of ionising radiation and makes further provision for employees where an emergency plan is put into place. Regulation 19 disapplies Regulation 12 (Dose limitation) of the 2017 Regulations to an emergency worker who is engaged in preventing or mitigating the consequences of a radiation emergency.

39. Regulation 18 extends the scope of the term emergency worker, to include persons or responding organisations who assist in the management of a radiation emergency on a voluntary basis. A volunteer from a voluntary responding organisation may be classed as an emergency worker if they have a defined role in the emergency plan and are given appropriate training. Although, only the courts can give an authoritative interpretation of law, in considering the application of these Regulations and ACOP to volunteers working under another's direction, account should be taken of section 3 of the Health and Safety at Work Act 1974 (HSWA) which places general duties on employers and self-employed persons, for persons other than their employees.

40. Regulation 20 provides that the operator's emergency plans and the local authority's off-site emergency plans must record reference levels in order to prioritise reducing doses to emergency workers and members of the public below an effective dose of 100mSv, or in exceptional circumstances below an effective dose of 500 mSv. Reference levels are recorded in emergency plans (and notified to the regulator under regulation 18). When the response to a radiation emergency is underway, reference levels may be revised or introduced for specific tasks. Specific reference levels may also be determined by the local authority on advice from the person coordinating the off-site response to that emergency. In exceptional circumstances, the reference level may be set in excess of 100 mSv, but not exceeding 500 mSv.

Flow diagrams to aid compliance

41. To assist the operator or local authority dutyholders with their compliance of the Regulations, the following flow diagrams (Figures 1-5) are representations that indicate how some sections/ topics/ regulations apply. Additional flow diagrams can also be found in Appendix 1 (Dispersibility Assessment) & 2 (Hazard Evaluation and Consequence Assessment). The diagrams do not replace or amend any requirements in the Regulations but illustrate some of the considerations necessary, steps that may be taken, and likely outputs to achieve compliance. (Where relevant, regulation numbers and ACOP references are shown in brackets.)

Figure 1: OPERATOR - REPPIR Applicability (Reg 3)

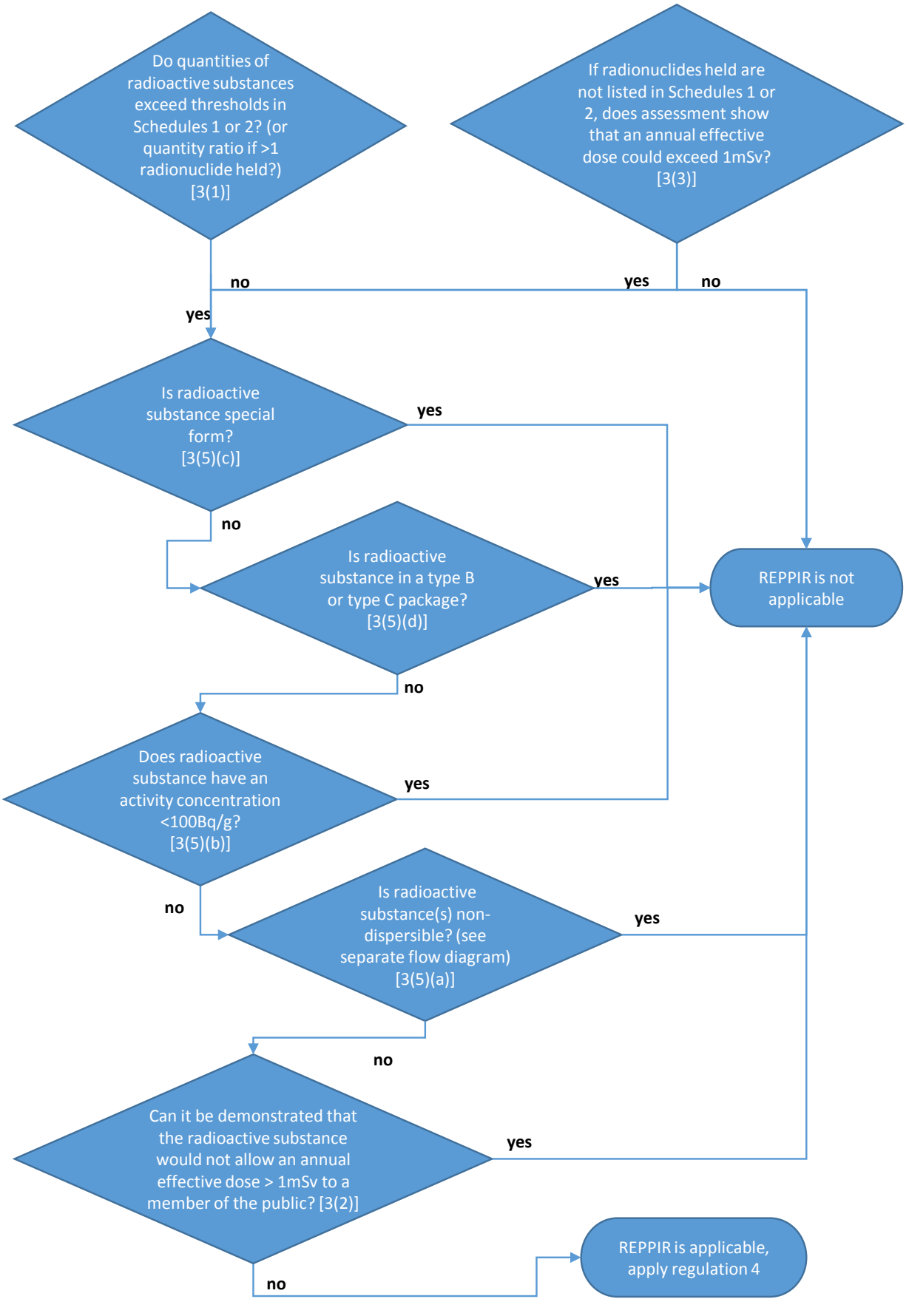
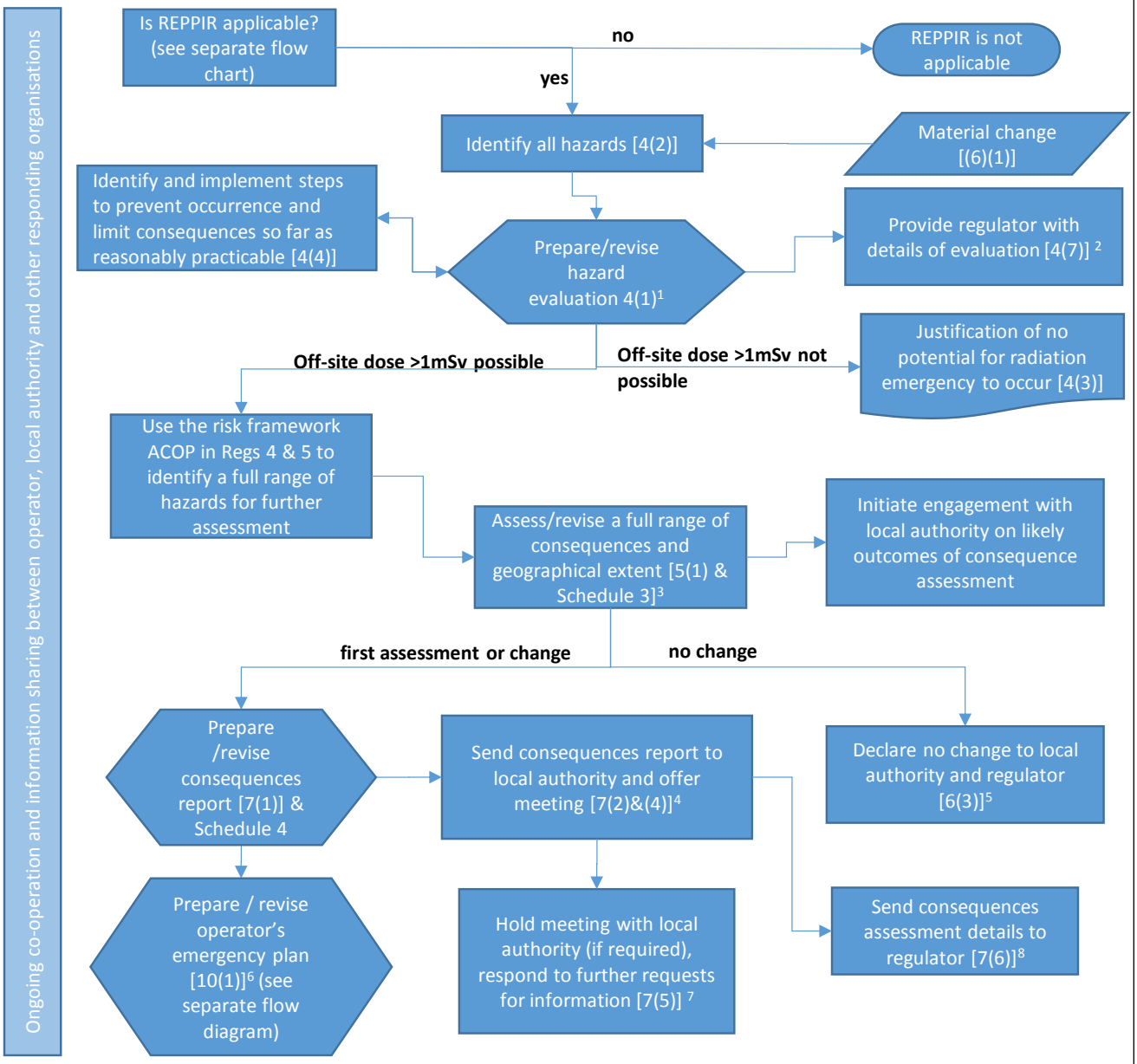
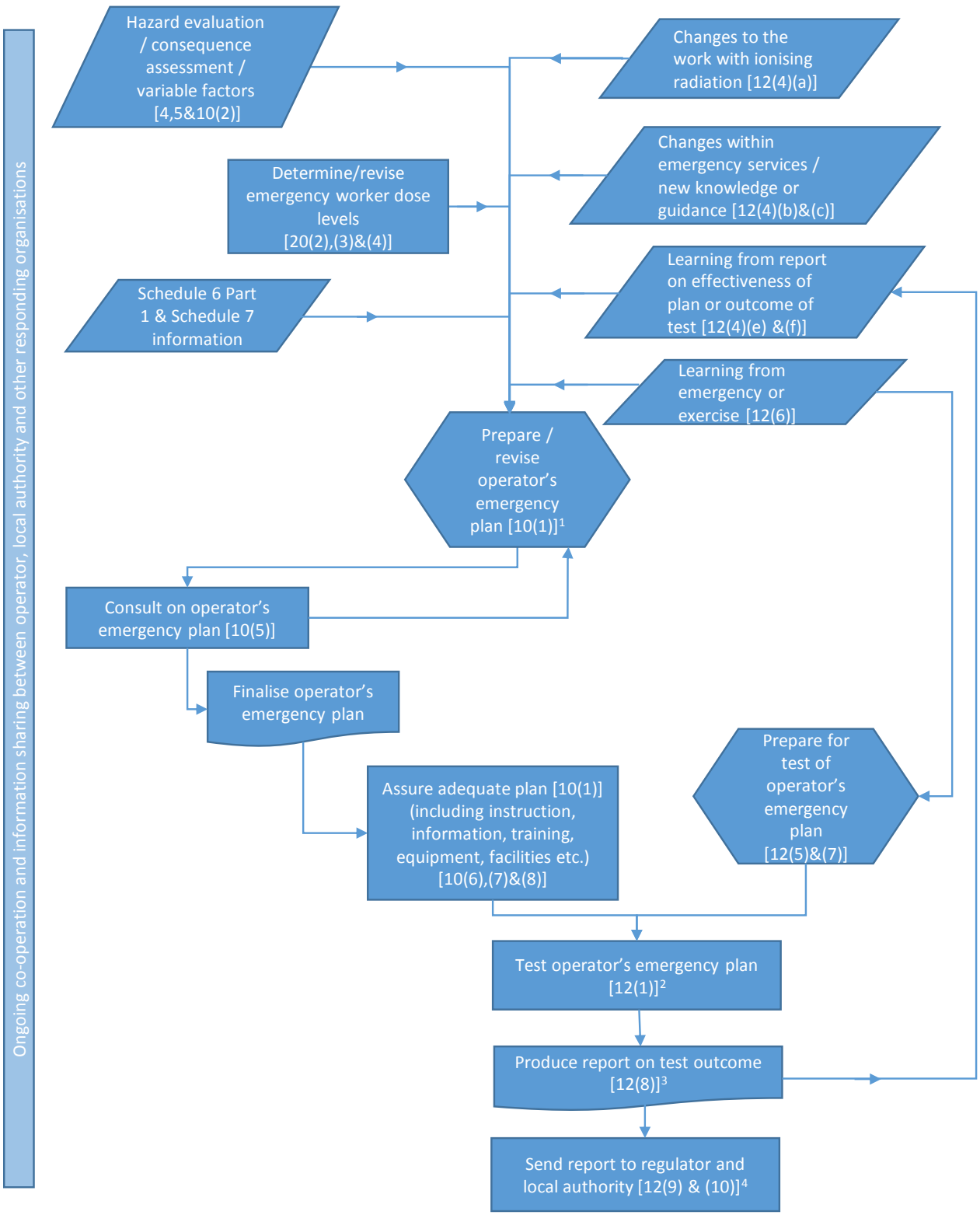


Figure 2: OPERATOR - Hazard evaluation and consequence report



[1] each revision must be within 3 years of the date of completion of the last evaluation.
[2] within 28 days of the date on which it is made.
[3] completed within 2 months after the day on which the hazard evaluation is completed [5(2)].
[4] as soon as practicable after completion of the report.
[5] within 28 days of making the declaration.
[6] a review of the plan must be carried out at least every three years although an operator may decide to make changes within the 3 years.
[7] within 28 days.
[8] within 28 days of sending to local authority.

Figure 3: OPERATOR - Planning and testing



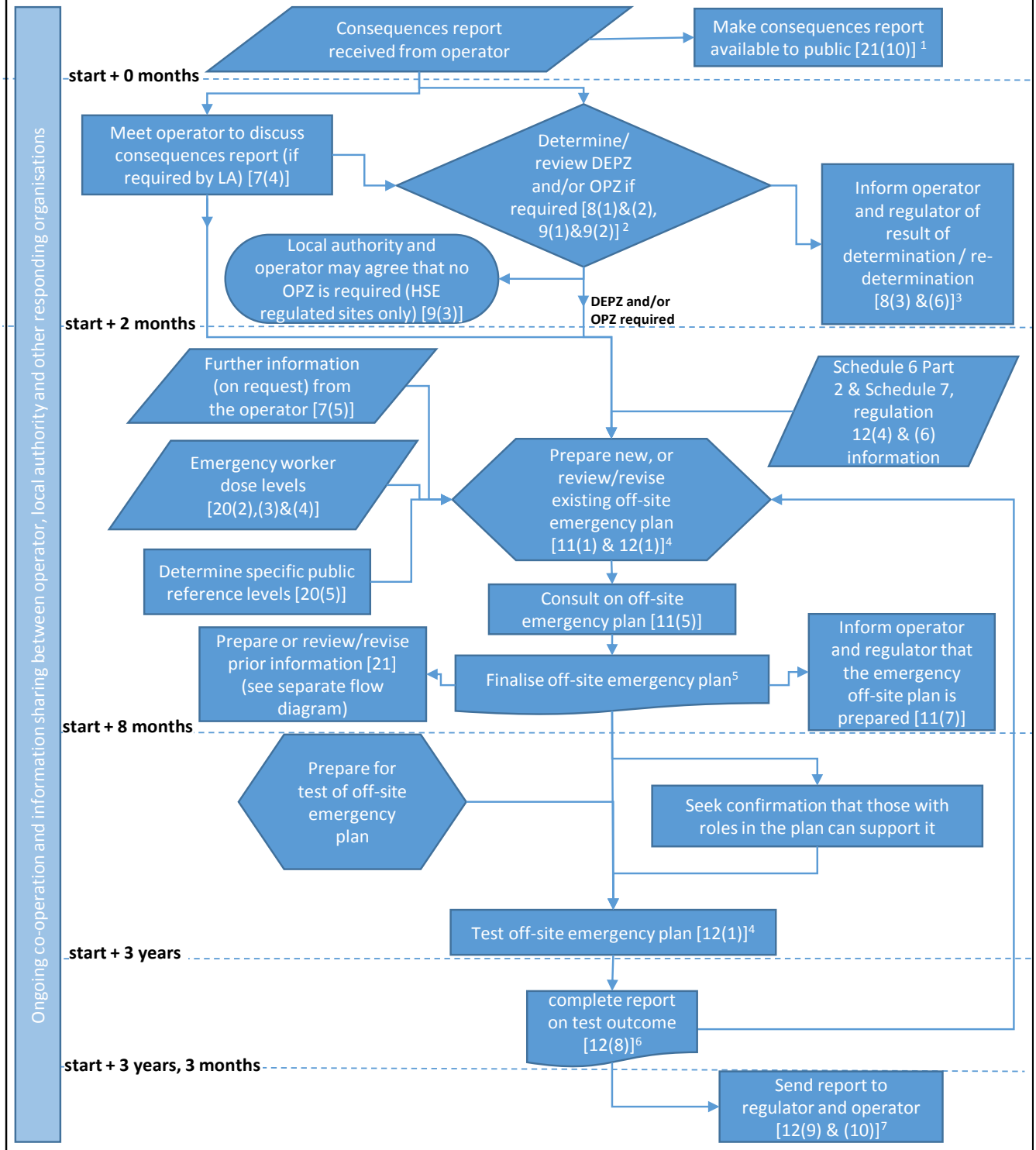
[1] a review of the plan must be carried out at least every three years although an operator may decide to carry out a review in advance of 3 years. The plan must also be reviewed as a consequence of a review of the hazard evaluation and consequence assessment [10(9)].

[2] a test of the plan must be carried out at least every three years although an operator may decide to carry out a test in advance of the 3 years.

[3] within 3 months of the completion of the test.

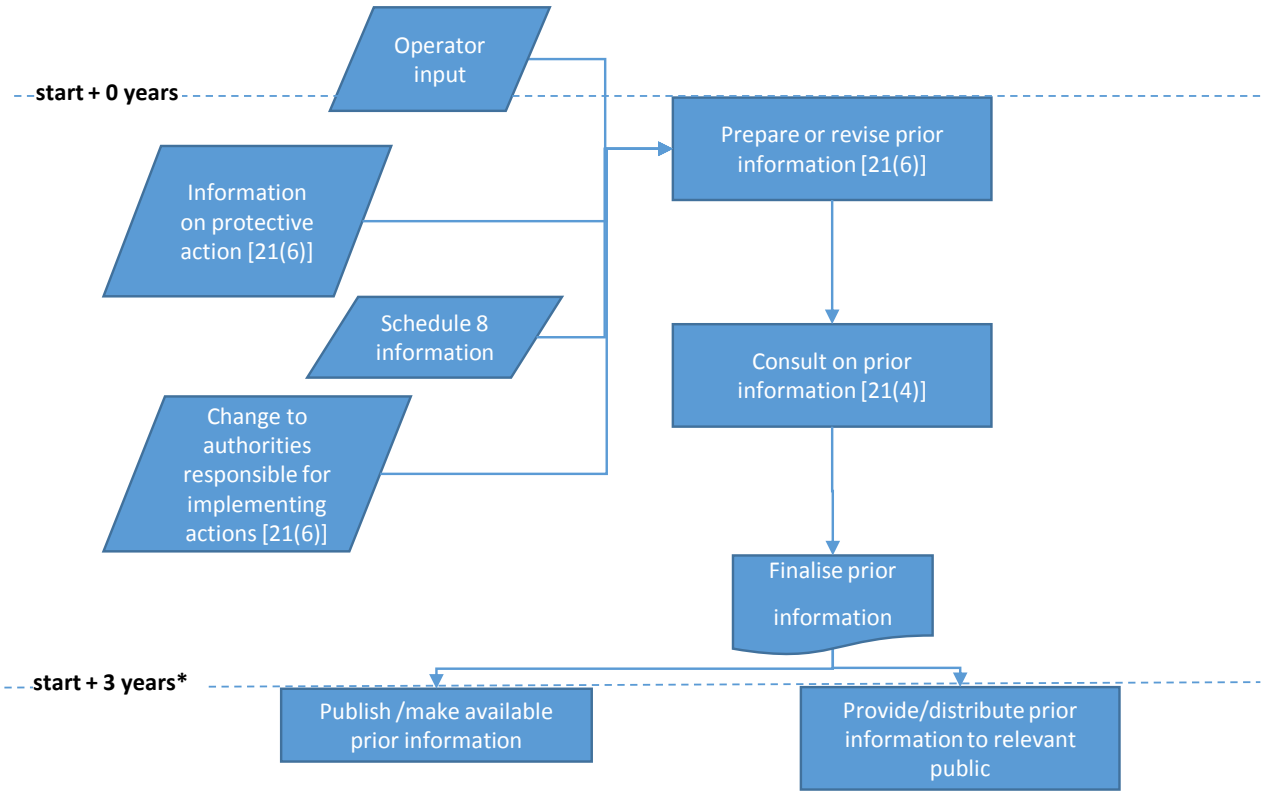
[4] within 28 days of its completion.

Figure 4: LOCAL AUTHORITY - Determination of planning zones, planning and testing



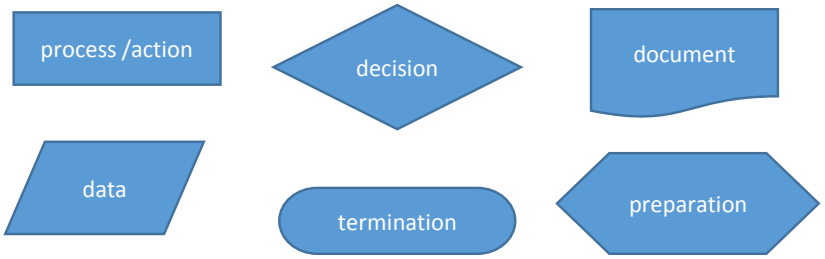
[1] as soon as reasonably practicable after the consequences report has been sent to the regulator.
[2] the local authority and the operator may agree that no DEPZ is required (reg 8(2)). Local authorities regulated by HSE may be required to determine the OPZ (reg 9(1)(b)). Default OPZ distances (reg 9(1)(a) may be varied.
[3] within two months of having received the consequences report.
[4] a review and test of the plan must be carried out at least every three years although a local authority may decide to review or test in advance of 3 years.
[5] within 8 months of the local authority's receipt of the consequences report.
[6] within 3 months of the conclusion of the test.
[7] within 28 days of completion.

Figure 5: LOCAL AUTHORITY - Duty to supply prior information to the public (Reg 21)



* Prior information should be reviewed and if required, revised at least every three years. Revision is also required if there are changes to protective actions or to the authorities responsible for implementing those actions.

Key to Flow Diagram Shapes



2019 No. 703

HEALTH AND SAFETY

The Radiation (Emergency Preparedness and Public Information) Regulations 2019

Made - - - -	*26th March 2019*
Laid before Parliament	*27th March 2019*
Coming into force - -	*22nd May 2019*

The Secretary of State makes these Regulations in exercise of the powers conferred by sections 15(1) and (1B), (2), (3)(a), (4), (5), 18(2)(za), and 43(2) and (4) of, and paragraphs 6, 8(1), 11, 13(2), 14, 15, 16, and 20 of Schedule 3 to, the Health and Safety at Work etc. Act 1974([2]) ("the 1974 Act").

The Secretary of State makes these Regulations independently of any proposals made by the Health and Safety Executive, as provided by section 50(1)(b) of the 1974 Act having consulted, in accordance with section 50(1AA)([3]) of that Act, the Executive, the Office for Nuclear Regulation and such other persons as appeared to the Secretary of State to be appropriate.

([2]) 1974 c. 37. Section 15(1) was substituted by paragraph 6 of Schedule 15 to the Employment Protection Act 1975 (c. 71) and amended by S.I. 2002/794. Section 15(1B) was inserted by, and (2) and (3)(c) amended by, paragraph 5 of Schedule 12 to the Energy Act 2013 (c. 32). Section 15(4)(a) was amended by S.I. 2008/960. Section 18(2)(za) was inserted by paragraph 6 of Schedule 12 to the Energy Act 2013. Section 43(6) was substituted by paragraph 12 of Schedule 15 to the Employment Protection Act 1975 and amended by S.I. 2002/794.

([3]) Section 50 was amended by paragraph 11 of Schedule 12 to the Energy Act 2013 and article 16 of S.I. 2008/960.

Regulation 1	Citation, commencement and extent
Regulation 1	*(1) These Regulations may be cited as the Radiation (Emergency Preparedness and Public Information) Regulations 2019 and come into force on the 22nd May 2019.* *(2) These Regulations do not extend to Northern Ireland.*

Regulation 2	Interpretation
Regulation 2(1)	*(1) In these Regulations, unless the context otherwise requires—* *"the 2017 Regulations" means the Ionising Radiations Regulations 2017([4]);* *"the Agency" in relation to premises or a plan relating to premises—* *a) in England, means the Environment Agency,* *b) in Wales, means Natural Resources Body for Wales, and* *c) in Scotland, means the Scottish Environment Protection Agency;* *"approved dosimetry service" means an approved dosimetry service within the meaning of the 2017 Regulations and which is approved for the purpose of regulation 22 of those Regulations;* *"authorised defence site" has the meaning given by regulation 2(1) of the Health and Safety (Enforcing Authority) Regulations 1998([5]);*
Guidance 2(1)	1 An authorised defence site may be referred to as *defence nuclear site* in this document. This term also includes a nuclear warship site and any licensed site where that licence has been granted either to the Secretary of State for Defence or to another person in relation to activities carried out by that person on behalf of the Secretary of State for Defence.
Regulation 2(1)	*"Category 1 responder" has the meaning set out in Parts 1, 2 and 2A of Schedule 1 to the Civil Contingencies Act 2004([6]);* *"Category 2 responder" has the meaning set out in Parts 3, 4 and 5 of Schedule 1 to the Civil Contingencies Act 2004([7])*

([4]) S.I. 2017/1075.

([5]) S.I. 1998/494. The reference to authorised defence site was introduced by paragraph 72 of Part 3 of Schedule 3 to S.I. 2014/469.

([6]) 2004 c. 36. Paragraph 1A was inserted by article 2 of S.I. 2011/1233. Parts 1 and 2 of Schedule 1 have also been amended by paragraph 27 of Schedule 1 to the National Health Service (Consequential Provisions) Act 2006 (c. 43), section 312 of and Part 8 of Schedule 22 to the Marine and Coastal Access Act 2009 (c. 23), paragraph 132 of Schedule 5, paragraph 16 of Schedule 7 and paragraph 100 of Part 2 of Schedule 14 to the Health and Social Care Act 2012 (c. 7), article 2 of S.I. 2008/3012, paragraph 429 of Part 1 of Schedule 2 to S.I. 2013/755, and paragraph 1 of Part 1 of Schedule 3 to S.S.I. 2013/119. Part 2A of Schedule 1 was inserted by article 41 of S.I. 2018/644.

([7]) Parts 3 and 4 of Schedule 1 have been amended by paragraph 132 of Schedule 5 to the Health and Social Care Act 2012, paragraph 16 of Schedule 9 to the Civil Aviation Act 2012 (c.19), paragraph 81 of Part 5 of Schedule 12 to the Energy Act 2013, paragraph 152 of Part 2 of Schedule 1 to the Infrastructure Act 2015 (c. 7), article 2 of S.I. 2005/2043, paragraph 4

Guidance 2(1)	2 Category 1 responding organisations are those at the core of the response to most emergencies and consist of the emergency services, local authorities and NHS bodies. Category 1 responders are subject to the full set of civil protection duties under CCA. 3 Category 2 responding organisations consist of the HSE, ONR, transport and utility companies. Category 2 responders do not tend to lead joint planning work but would be heavily involved in a incident that affects their own sector. Category 2 responders have a lesser set of duties under CCA than category 1 responders including co-operating and sharing relevant information with other Category 1 and 2 responders.
Regulation 2(1)	*"consequences report" has the meaning set out in regulation 7(1);* *"detailed emergency planning zone" means a zone determined in accordance with regulation 8 and covered by the local authority's off-site emergency plan;* *"dose" means, in relation to ionising radiation, any dose or sum of dose quantities to which an individual is exposed as a result of a radiation emergency;* *"dose assessment" means the dose assessment made and recorded by an approved dosimetry service in accordance with regulation 22 of the 2017 Regulations;* *"dose record" means the record made and maintained in respect of an employee by the approved dosimetry service in accordance with regulation 22 of the 2017 Regulations;* *"emergency exposure" means an exposure of an employee engaged in an activity of or associated with the response to a radiation emergency or potential radiation emergency in order to bring help to endangered persons, prevent exposure of other persons or save a valuable installation or goods, whereby one of the individual dose limits referred to in paragraphs 1 and 2 of Part 1 of Schedule 3 to the 2017 Regulations could be exceeded;*
Guidance 2(1)	4 The dose limits in the 2017 Regulations referred to in the definition of emergency exposure are those applicable to employees of 18 years of age or above. Emergency exposures are exposures which exceed these dose limits and are incurred by emergency workers.
Regulation 2(1)	*"emergency services" means—* *a) those police, fire and ambulance services who are likely to be required to respond to a radiation emergency which has occurred at the premises of an operator, and* *b) where appropriate, Her Majesty's Coastguard;* *"emergency worker" means any person who has a defined responding role in an operator's emergency plan or a local authority's off-site emergency plan, and who might be exposed to radiation as a result of a potential or actual radiation emergency;*
Guidance 2(1)	5 An emergency worker is someone who might be exposed to radiation while taking action in response to an emergency and has a defined role in an emergency plan. To be in receipt of such exposures, their role will usually involve working on the operator's premises or in the vicinity of the premises. For example in a detailed emergency planning zone during the radiation emergency. A volunteer from a voluntary organisation may be classed as an emergency worker if they have a defined role in the emergency plan and have been given appropriate training. However, a member of the public volunteering their services on the day of an emergency would not. People providing assistance to the handling of the radiation emergency but unlikely to be exposed to radiation arising from the radiation emergency (e.g. people located remote to the premises) are not considered to

of Part 1 of Schedule 1 to S.I. 2005/3050, paragraph 6 of Part 1 of Schedule 1 to S.I. 2016/645, and article 41 of S.I. 2018/644. Part 5 of Schedule 1 was inserted by article 41 of S.I. 2018/644.

	be emergency workers. 6 A member of the public is any person not being; (a) a person for the time being present on premises where a radiation emergency can occur or where a radiation emergency has actually occurred, or (b) a person engaged in an activity of or associated with the response to a radiation emergency;
Regulation 2(1)	*"existing exposure situation" means an exposure situation which does not call or no longer calls for the implementation of any protective action from an emergency plan;*
Guidance 2(1)	7 When the state is returned to an existing exposure situation the situation is no longer in an emergency phase and has transitioned to the recovery phase or beyond.
Regulation 2(1)	*"health authority" means—* *(a) in relation to England, a clinical commissioning group established under section 14D of the National Health Service Act 2006([8]),* *(b) in relation to Wales, means a local health board established under section 11 of the National Health Service (Wales) Act 2006([9]), and* *(c) in relation to Scotland, a health board established under section 2 of the National Health Service (Scotland) Act 1978([10]);* *"installation" means a unit in which the radioactive substances present are, or are intended to be, produced, used, handled or stored, and it includes—* *(a) equipment, structures, pipework, machinery and tools, and* *(b) docks, unloading quays, jetties, warehouses or similar structures, whether floating or not;* *"ionising radiation" means the energy transferred in the form of particles or electromagnetic waves of a wavelength of 100 nanometres or less or a frequency of 3 x 10^{15} hertz or more capable of producing ions directly or indirectly;* *"licensed site" means a site in respect of which a nuclear site licence has been granted and is in force;* *"local authority" means in relation to—* *(a) London, the London Fire Commissioner,* *(b) an area where there is a Metropolitan County Fire and Rescue Authority, that authority,* *(c) the Isles of Scilly, the Council of the Isles of Scilly,* *(d) an area in the rest of England, the county council for that area, or, where there is no county council for that area, the district council for that area,* *(e) an area in Scotland, the council for the local government area, and* *(f) an area in Wales, the county council or the county borough council for that area*;
Guidance 2(1)	8 Local authorities have duties in connection with determining the detailed emergency planning zone (regulation 8); the preparation, review, revision, testing and implementation of off-site emergency plans (regulations 11, 12 and 17); and in making arrangements to supply information prior to and in the event of an radiation emergency (regulations 21 and 22). 9 In England, the local authority will be the relevant county council, unitary authority or

([8]) 2006 c. 41. Section 14D was inserted by section 25 of the Health and Social Care Act 2012
([9]) 2006 c. 42.
([10]) 1978 c. 29.

	Metropolitan Fire & Rescue Service for metropolitan district areas. In London, the local authority duty is discharged by the London Fire Commissioner on behalf of the London Mayor. In Scotland and Wales, the local authority will be the relevant council. 10 Where the ACOP and guidance refers to a "lead local authority", this is the local authority as defined in regulation 2(5) and in which the relevant premises resides.
Regulation 2(1)	*"medical surveillance" means medical surveillance carried out in accordance with the 2017 Regulations;* *"new nuclear build site" has the meaning given by regulation 2A of the Health and Safety (Enforcing Authority) Regulations 1998[11];* *"non-dispersible source" means a sealed source or a radioactive substance which in either case, it is determined that by virtue of its physical and chemical form cannot cause a radiation emergency but does not include any radioactive substance that is or has been a component of a nuclear reactor;*
Guidance 2(1)	11 A non-dispersible source may be any radioactive source that can be shown, by physical testing and/or by assessment, to retain the radioactive material following fire damage, mechanical or chemical trauma or from a combination of these factors and any others that are representative of the effects of any non-routine situation or event. 12 Operators who work solely with radioactive substances that have physical and chemical properties that render them incapable of significant dispersal during any non-routine situation or event can carry out a non-dispersibility assessment to make the case that further duties under these Regulations are not required. See the guidance for regulation 3 and Appendix 1 for details of how the assessment should be carried out. **Radioactive materials that cannot be considered as non-dispersible** 13 The following cannot be considered as 'non-dispersible' and are outside the scope of regulation 3(5)(a) of these Regulations: • a nuclear fuel element or the remains of a nuclear fuel element following degradation or processing, • defueled reactor vessels, nor their component parts, or • radioactive waste, either in its raw state, after processing or after immobilisation (unless it is a sealed source which has been declared as waste).
Regulation 2(1)	*"nuclear site licence" has the meaning assigned to it by section 1(1) of the Nuclear Installations Act 1965[12];* *"nuclear warship site" has the meaning given by regulation 2B of the Health and Safety (Enforcing Authority) Regulations 1998[13];* *"off-site emergency plan" is to be interpreted in accordance with regulation 11;* *"operator" has the meaning set out in paragraph (2);* *"operator's emergency plan" are to be interpreted in accordance with regulation 10;* *"outline planning zone" means a zone determined in accordance with regulation 9 and covered by the local authority's off-site emergency plan;* *"premises" means—* *(a) the whole of an area under the control of an operator where radioactive substances are present in one or more installations, and for this purpose two or*

([11]) Regulation 2A was inserted by paragraph 73 of Part 3 of Schedule 3 to S.I. 2014/469.
([12]) 1965 c. 57. Section 1 was substituted by paragraph 17 of Part 2 of Schedule 12 to the Energy Act 2013.
([13]) Regulation 2B was inserted by paragraph 73 of Part 3 of Schedule 3 to S.I. 2014/469.

	more areas under the control of the operator and separated only by a road, railway or inland waterway shall be treated as one whole area, or *(b) where radioactive substances are present on a licensed site, that licensed site, or* (c) *where a radioactive substance forms an integral part of a vessel and is used in connection with the operation of that vessel, includes when that vessel is at fixed point moorings or alongside berths, save that such a vessel is to be deemed separate premises only where such moorings or berths do not form part of a licensed site or part of premises under the control of the Secretary of State for Defence;*
Guidance 2(1)	14 Premises constitute one or more installations, such as buildings or facilities where radioactive substances are produced, used, handled or stored. Such buildings or facilities may be served by, for example, railway sidings within nuclear licensed sites, or jetties/quays at ports, and where such railway sidings or jetties/quays are considered as part of those particular installations. Container parks at ports would also count as installations or premises in their own right. **Hospitals and universities** 15 Hospital and university campuses are single premises. Separate facilities in which work with ionising radiation is undertaken on such campuses under the overall control of the hospital or university administration, such as independently-funded research units, are installations within those premises. Only separate facilities that are physically located on the campus but are completely outside the control of the hospital or university administration, such as a completely independent science park with its own separate administration, should be considered as separate premises. Individual hospital or university buildings that are not located on a campus are separate premises, except where two or more buildings are co-located (separated only by a right of way such as a road), where such co-located buildings would together form a single premises. **Industrial complexes** 16 An industrial complex where the work with ionising radiation is under the control of one person is a single premises, and would cover all facilities run by all employers on the complex. Only facilities on the industrial complex which are completely outside the control of the industrial complex administration should be considered as separate premises. **Ports and airports** 17 At ports and airports, all co-located areas within the port or airport (separated only by, for example, a road or railway) under the control of an operator together form one premises. However, an operator may have more than one premises within a port or airport if the areas under the control of that person are sufficiently remote from one another (e.g. transit sheds). 18 Once Radiation (Emergency Preparedness and Public Information) Regulations 2019 (REPPIR) quantities (see Schedules 1 and 2) of radioactive substances have been unloaded from a ship or aircraft onto the quayside or tarmac they should be treated as part of the premises. The operator is responsible for any relevant REPPIR assessments and emergency plans. Therefore, the interface between transport and premises is the point at which the radioactive substance has been unloaded or loaded. 19 When the radioactive substances are moved (e.g. by fork-lift truck) from the point of unloading to a storage site, if the quayside/tarmac and storage site are controlled by the same person, they would constitute one premises and both need to be covered by the same assessment and emergency plan. 20 If the quayside/tarmac was controlled by another person, REPPIR would apply to both operators for the two separate premises. If the quayside/tarmac was a public place or

	a road, the Carriage of Dangerous Goods Regulations 2009, as amended in 2019 (CDG) would apply until the radioactive material was unloaded at the storage site. 21 Whatever radioactive substances above REPPIR threshold quantities are stored, even if these substances are stored for very short periods (as is often the case at airports), the place where they are stored is a premises to which REPPIR applies. There is no exemption for 'intermediate temporary storage', as in the Control of Major Accident Hazards Regulations 2015 (COMAH). 22 Vessels that are powered by nuclear reactors are to be treated as separate premises when at fixed point moorings such as buoys or alongside berths (known as nuclear warship sites), unless they are moored at a nuclear licensed site or Ministry of Defence (MOD) controlled premises in which case they are part of those premises. For emergency planning purposes at non-licensed commercial docks, it is the geographical identity of a particular vessel at a particular mooring or berth that is the key factor. For example, a vessel at a berth constitutes a premises. If that same vessel moves to a different geographical location, then this constitutes a different premises. The assessment for a particular vessel needs to underpin the off-site emergency plan for that vessel at a particular mooring or berth, and the off-site emergency plan needs to be in place before the vessel arrives at that mooring or berth. 23 Ships and aircraft loading and unloading radioactive substances would count as transport and be covered by MCA (Maritime and Coastguard Agency) and CAA (Civil Aviation Authority) legislation.
Regulation 2(1)	*"protective action" means an action or actions taken in order to prevent or reduce the exposure of emergency workers, members of the public, the environment or the contamination of property from ionising radiation in the event of a radiation emergency, and includes the provision of appropriate information to the public in accordance with regulations 21 and 22;*
Guidance 2(1)	24 This is action that is taken to prevent or reduce radiation exposure of workers, members of the public, environment and contamination of property in the event of a radiation emergency. 25 Protective actions include: (a) Mitigatory action which is immediate action taken by the operator or other party, in relation to a radiological hazard on the premises, to: (i) Reduce, and where possible prevent, the potential for conditions to develop that would result in exposure or a release of radioactive material requiring emergency response action on and/or off the premises; (ii) Mitigate source conditions that may result in exposure or a release of radioactive material that require, or are likely to require, urgent or longer term protective actions on and/or off the premises; and (iii) Prevent escalation of an emergency and to return the facility to a safe and stable state. (b) Urgent protective action which is aimed at reducing exposure to people prior to and during the early phase of a radiation emergency. It includes sheltering-in-place; administration of stable iodine; evacuation; and restrictions on food and water supplies. Some of this action may be taken on a precautionary basis. In addition, other urgent protective actions such as personal decontamination, medical intervention and reassurance monitoring may be required at an individual level and on a case-by-case basis, according to the prevailing circumstances. (c) Longer term protective action which is aimed at reducing exposure to people during the intermediate and long term phase resulting from a radiation emergency (such as transition to an existing exposure situation). This action includes continuing restrictions on food and water supplies; temporary and permanent

	relocation; and recovery action. Recovery action provides protection from longer term exposures from contamination of the environment and food supplies. Some longer term protective actions, such as follow-up health surveillance may be taken on a precautionary basis.
Regulation 2(1)	*"radiation emergency" means a non-routine situation or event arising from work with ionising radiation that necessitates prompt action to mitigate the serious consequences—* *(a) of a hazard resulting from that situation or event;* *(b) of a perceived risk arising from such a hazard; or* *(c) to any one or more of—* *(i) human life;* *(ii) health and safety;* *(iii) quality of life;* *(iv) property;* *(v) the environment;*
Guidance 2(1)	26 The term radiation emergency is central to the interpretation of the main requirements of REPPIR as it encompasses all events which could potentially lead to an emergency for which the response necessitates the level of planning that REPPIR commands. 27 A non-routine situation or event could be as a consequence of a deviation in normal activity of persons, equipment, systems, installations, or facilities, or due to an external factor. Examples of initiating events are plant and equipment failures, breakdown of administrative arrangements, human error, extreme weather or seismic activity. 28 For the purposes of REPPIR, in addition to consideration of perceived risks (see paragraphs 34-36), all events that may result in an annual effective radiation dose of 1mSv or more to one or more person(s) off-site over a period of one year following the event are considered to be a radiation emergency. **Serious Consequences** 29 The definition of a radiation emergency covers serious consequences that might arise from releases of radiation including consequences to human life, health and safety, quality of life, property and the environment. There are no serious radiological consequences under the REPPIR threshold of an annual effective radiation dose of 1mSv over a period of one year following the radiation emergency. The impact table (Appendix 2, Figure 1) provides descriptions of the impact at different dose levels against all the factors identified in the definition of a radiation emergency. 30 In the impact table (Appendix 2, Figure 1) the rows denote impact and the columns denote descriptors. Impacts are categorised as being either limited, minor, moderate, significant or catastrophic. Descriptors are the factors which would be impacted by a radiation emergency as defined and include human life, health and safety, quality of life, property and the environment. The impact table provides qualitative descriptions of what the impact would be in the context of each of these factors. For example, a catastrophic impact on property is described as the asset value being completely lost. Dose exposure ranges are identified which relate to each of the impact levels identified. 31 By using this radiation dose threshold of 1 mSv based on radiological consequences, other types of serious consequences (e.g. to human life, health and safety, quality of life, property and the environment) do not require further explicit assessment. Since assessment using this low exposure threshold will ensure that all events with serious consequences will be identified for the purpose of the hazard evaluation, events below this threshold will not be a radiation emergency. Further assessment of the additional factors

Guidance 2(1)	identified in the definition is not necessary as any situation that would require prompt action from considerations of human life, health and safety, quality of life, property, and the environment is bounded by the radiological consequences. 32 In most cases REPPIR requires a more detailed level of planning for non-routine events than the 2017 Regulations and other health and safety regulations. This is because of the potentially serious consequences of certain events occurring whilst working with large amounts of radioactive material (i.e. quantities or masses of radionuclides greater than those in Schedule 1 or Schedule 2). Therefore, a radiation emergency, as defined in REPPIR, encompasses only those events that could give rise to serious consequences. For the purposes of REPPIR, the effects, or perceived effects of ionising radiation must have a bearing on the overall consequences. **Prompt Mitigatory Action** 33 Any initiating event that leads to a radiation emergency will require prompt action to be taken to mitigate the consequences. The need for prompt mitigatory action is key to the definition. Therefore, consideration is only necessary of those events that require steps to be taken as soon as is reasonably practicable and that have the purpose of mitigating the serious consequences. For example, prompt action would usually need to be taken to mitigate hazards such as fires, explosions, radiation releases or irradiation events, which could all potentially have serious consequences. **Perceived Risk** 34 Prompt mitigatory action could also be required to respond to a perceived risk arising from a situation or event occurring on any premises. An example of a perceived risk could emanate from an explosion on the premises being heard by persons situated at a distance from that premises but where there is no release or exposure to radiation. In this case, the operator should determine whether the situation constituted a radiation emergency based on expert knowledge of the plant, prior hazard evaluation and the evolving situation and to determine if and what urgent protective actions are to be taken. The operator should also consider the likelihood of any serious consequences from the perceived risk, i.e. could persons off-site take action that could cause detrimental harm to themselves or others? Any action taken by persons off-site may be due to a lack of knowledge of the risk. For example, the local population around a nuclear premises could be alarmed due to their knowledge of the site and make an incorrect assumption that there has been a release of radiation. Social media has the potential to promulgate concern in a very short period which could cause disruption, panic and harm to people (e.g. by initiating self-evacuation). Meanwhile the operator may consider that there would be no serious consequences directly from the event on the premises. However prompt action may be required to communicate the risk, or absence of risk, from the explosion to the local population, to provide reassurance and to make clear that no action is required. 35 Conversely, assumptions made by the local population on hearing an explosion from a hospital with a nuclear medicine facility are unlikely to cause concern of a release of radiation. In this and similar cases, the perceived risk need not be considered, although some communication with members of the public might be necessary. 36 For defence nuclear sites and operational berths, public perception could vary. In each case, the operator should use their knowledge of perceived risk locally to inform the development of appropriate plans. **Action to mitigate the serious consequences to the environment** 37 Prompt actions with regard to the environment, such as preventing or minimising contamination or movement of land, water, air, plants and animals, are those relating to long-term human health protection.

Regulation 2(1)	*"radiation protection adviser" means radiation protection adviser within the meaning of the 2017 Regulations and who is recognised as such for the purpose of regulation 14 of those Regulations;* *"radioactive substance" means any substance which contains one or more radionuclides whose activity cannot be disregarded for the purposes of radiation protection;* *"reference level" is to be interpreted in accordance with regulation 20;* *"regulator" means—* *(a) the Health and Safety Executive; or* *(b) the Office for Nuclear Regulation in the event the premises is—* *(i) a licensed site;* *(ii) an authorised defence site);* *(iii) a nuclear new build site; or* *(iv) nuclear warship site;* *(c) but in the event that an agreement has been reached between the Health and Safety Executive and the Office for Nuclear Regulation to transfer responsibility in respect of specific premises, the person to whom that responsibility was transferred;* *"sealed source" means a source containing any radioactive substance whose structure is such as to prevent dispersion of radioactive substances into the environment;* *"work with ionising radiation" means work involving the production, processing, handling, use, holding, storage or disposal of radioactive substances which can increase the exposure of persons to radiation from an artificial source, or from a radioactive substance containing naturally occurring radionuclides which are processed for their radioactive, fissile or fertile properties.*
Guidance 2(1)	38 Sealed source is relevant to the definition of non-dispersible source (see paragraphs 11-13 on the definition of 'non-dispersible source').
Regulation 2(2)	*2. In these Regulations, any reference to an operator is a reference to—* *(a) in relation to any premises other than a licensed site, the person who is, in the course of a trade or business or other undertaking carried on by that person, in control of the operation of premises, and* *(b) in relation to a licensed site, a person to whom a nuclear site licence has been granted,* *and any duty imposed by these Regulations on the operator extends only in relation to those premises.*
Guidance 2(2)	39 The operator is the person or organisation in control of the premises. At ports and airports, the premises usually include the storage site and sometimes also include the quayside or tarmac onto which the radioactive substances are unloaded and any intervening areas (see paragraphs 14-23 on the definition of 'premises' - ports and airports - in regulation 2(1)). At ports, the operator is usually either the berth operator or the harbour authority but in this document they will be referred to as the berth operator. At airports, this operator is usually known as the transit shed operator and will be referred to as such. 40 Where duties under these Regulations are imposed on an operator for the first time, that operator is referred to as a 'new operator' in this ACOP and guidance.

Regulation 2(3)-2(5)	*(3) In these Regulations—* *(a) any reference to an effective dose means the sum of the effective dose to the whole body from external ionising radiation and the committed effective dose from internal ionising radiation; and* *(b) any reference to equivalent dose to a human tissue or organ includes the committed equivalent dose to that tissue or organ from internal ionising radiation.* *(4) In these Regulations, unless the context otherwise requires, any reference to—* *(a) an employer includes a reference to a self-employed person and any duty imposed by these Regulations on an employer in respect of its employee extends to a self-employed person in respect of that self-employed person,* *(b) exposure to ionising radiation is a reference to exposure to ionising radiation arising from work with ionising radiation.* *(5) In these Regulations, references to "local authority", unless the context otherwise requires, are to the local authority in which the premises are situated, and references to "lead local authority", where more than one local authority is involved, are to that local authority.*
Guidance 2(3)-2(5)	41 In circumstances where the premises is not situated within any local authority's jurisdiction, such as mooring points/ buoys located off-shore, the lead local authority should generally be the geographically nearest local authority area to that premises. Additionally, where two or more local authorities lie at similar distances, the lead local authority should be the one with the most significant emergency planning requirements. Under regulations 13 (Cooperation: Operator and local authority) and 14 (Cooperation between local authorities) the local authorities and operator should agree who is the most appropriate 'lead local authority' and that local authority should inform the relevant regulator as soon as practicable.

Regulation 3	**Application**
Guidance 3	42 REPPIR applies to premises where work involves quantities of radionuclides that exceed those in Schedule 1, or exceed the masses of fissile material in Schedule 2 unless the operator can demonstrate that the quantity present would not allow an annual effective dose greater than 1mSv to a member of the public following a radiation emergency. Where more than one radionuclide is used, REPPIR applies when the quantity ratio (calculated as described in Schedule 1 Part 2) is less than one. 43 The radionuclides and quantities in Schedule 1 have been derived by Public Health England (PHE) modelling the consequences of a worst-case release (100% inventory ground level release of the radioactive material present, members of the public at a distance of 100 m, and food production at a distance of 1 km) and a conservative 12 month occupancy emergency scenario involving the release of radioactive substances from a premises (see Schedule 1 methodology report, PHE) [12]. 44 The masses of fissile material in Schedule 2 are derived from their potential to produce a criticality emergency. 45 Some radioactive materials in quantities greater than Schedule 1 are exempt under regulation 3(5). Exemption is on the basis that, by the nature of their containment or low specific activity concentration, they comply with the principle that, in broad terms, an annual effective dose to a member of the public in excess of 1 mSv cannot occur.

Regulation 3(1)-3(4)	*(1) Subject to paragraphs (2) and (5) and with the exception of regulation 22, these Regulations apply to any work with ionising radiation which involves having on any premises, or providing for there to be on any premises, a radioactive substance containing more than the quantity specified in relation to that radionuclide in Schedule 1 or, in the case of fissile material, more than the mass of that material specified in Schedule 2.* *(2) These Regulations do not apply to work falling within paragraph (1) where the operator can demonstrate that the quantity present on the premises would not allow, in a radiation emergency situation, an annual effective dose to persons off-site of greater than 1 mSv.* *(3) Where a radionuclide is not specified in Schedule 1—* *(a) an operator must carry out an assessment to determine whether the quantity present on the premises allows an annual effective dose greater than that specified in paragraph (2); and* *(b) if that assessment demonstrates that an annual effective dose greater* *(b) than that specified in paragraph (2) is allowable, then these Regulations apply.* *(4) For the purposes of paragraph (1), a quantity specified in Schedule 1 is to be treated as being exceeded if—* *(a) where only one radionuclide is involved, the quantity of that radionuclide exceeds the quantity specified in the appropriate entry in Part 1 of Schedule 1; or* *(b) where more than one radionuclide is involved, the quantity ratio calculated in accordance with Part 2 of Schedule 1 exceeds one.*
Guidance 3(1)-3(4)	**Application to premises** 46 REPPIR applies to work with ionising radiation where the quantity of any radionuclide on the premises exceeds a specified quantity in Becquerels in Part I of Schedule 1. Where there is more than one radionuclide on the premises, REPPIR applies to those premises if the quantity ratio, calculated in accordance with the equation in Part 2 of Schedule 1, is greater than one. The quantities are those present on the premises, including any planned increases in quantities in the facilities provided. These quantities may be different from the maximum quantities for the premises authorised under The Environmental Permitting (England and Wales) Regulations 2016 [13] and The Environmental Authorisations (Scotland) Regulations 2018 (EASR) [14]. 47 REPPIR also applies to premises where the mass of any fissile material on the premises exceeds a specified quantity in grams in Schedule 2. This application relates to the potential criticality of the fissile material. 48 For radionuclides not specified in Schedule 1, the operator must carry out an assessment to determine whether the quantity present on the premises could result in an annual effective dose to a member of the public greater than 1 mSv. This assessment should follow the methodology used and published by PHE [12] to calculate the values listed in Schedule 1. 49 In relation to premises, all the radioactive substances in all the installations (except the sources and radioactive substances exempted by regulation 3(5)) must be considered when calculating the quantity ratio across the whole premises. If the quantity ratio exceeds one, then REPPIR applies. If the quantity ratio is less than or equal to one, then REPPIR does not apply. The sources and radioactive substances exempted by regulation 3(5) can be excluded from the calculation since it is not credible that these would significantly contribute to an annual effective dose to members of the public. 50 Although, there may be greater activity or mass of radioactive materials on a

premises than in Schedule 1 or 2 respectively, where the operator can demonstrate that the radiological consequences from an event on the premises will result in an effective dose over one year of less than 1 mSv then these Regulations do not apply. Records of this demonstration should be maintained in accordance with regulation 23.

51 Following the comparison of the inventory (for each radionuclide held) against the Schedule 1 value, if at least one inventory exceeds the Schedule 1 value (or if the sum of the ratios exceeds a value of 1), then REPPIR applies unless the provisions of regulation 3(5) can be demonstrated and the operator must undertake a hazard evaluation under regulation 4.

52 Regulation 3(2) will apply where a hazard evaluation carried out under regulation 4 clearly demonstrates that a radiation emergency is not capable of resulting in an annual effective dose to persons off-site exceeding 1 mSv. Such a demonstration may, for example, be made by the operator:

(a) refining some of the parameters used by PHE to calculate the values in Schedule 1 (see paragraph 43) to be specific to the site and its consequences, thus resulting in a less generic and conservative assessment, and a more representative and premises specific assessment. For lower hazard premises operators may request PHE datafiles [15] that simplify such assessments. These datafiles facilitate consideration of less than 100% of the inventory being available for release, an elevated (above ground level) effective release height, and persons and food production at distances greater than those considered in Schedule 1 [12]. Using these datafiles may enable operators with quantities greater than Schedule 1 values to demonstrate that effective doses over one year are less than 1 mSv; or
(b) using the guidance under regulations 4, 5, and 7 to assist in making the case for demonstrating compliance with regulation 3(2).

53 Where an operator performs an assessment in accordance with paragraph 52 the operator is expected to provide the demonstration in the form of a hazard evaluation as required under Regulation 4. Specifically, a copy of the hazard evaluation needs to be sent to the relevant regulator in accordance with Regulation 4(7) to allow verification checks by the relevant regulator where appropriate.

54 If a premises changes ownership the new operator would have to consider the application of regulation 3 to their work activity.

Application to transport

55 REPPIR does not specifically apply to the transport of radioactive materials. (For road, rail and inland waterway, the CDG applies. For air, the International Civil Aviation Organization's Technical Instructions for the Safe Transport of Dangerous Goods by Air (Doc 9284) [16] apply. For sea, the International Maritime Dangerous Goods (IMDG) Code [17] together with a number of International Maritime Organisation (IMO) Resolutions [18], and, where relevant, the International Code for the Safe Carriage of Packaged Irradiated Nuclear Fuel, Plutonium and High-Level Radioactive Waste on Board Ships (INF) Code [19], apply.) However:

(a) movement of radioactive materials through public places by other means, such as pipelines are included in REPPIR.
(b) the requirement to provide information to the public in the event of an emergency in regulation 22 applies to any emergency which does or could have the same impact as a radiation emergency, however that emergency may arise, and therefore includes transport emergencies.

56 A public place includes public rights of way and other premises or places to which at the time in question members of the public have or are permitted to have access, whether on payment or otherwise. To decide whether a place is a public place, the test is whether

	the place in question is one where members of the public might be found and over which they might be expected to be passing or using for the purposes of access. Where use of the place is tolerated by the proprietor, that place is a public place. For hospitals, ports and airports, there may be areas within its boundary which are public places and those which are not. 57 Berth and transit shed operators at ports and airports, where radioactive materials may or may not be unloaded, are considered operators under REPPIR if they handle or store non-exempt quantities of radionuclides or masses of fissile material greater than those indicated in Schedules 1 or 2, even on a temporary basis. **Application to uranium** 58 Uranium commonly occurs as either natural, enriched, or depleted uranium. These terms refer to the proportion of the isotopes ^{238}U, ^{235}U, and ^{234}U in the material. Natural uranium, that is uranium as it is extracted from its ore, consists mostly of the ^{238}U isotope, with the ^{235}U and ^{234}U isotopes respectively comprising approximately 0.72% and 0.006% of natural uranium by mass. Enriched uranium is prepared for its fissile properties and, as a result, is enriched to various degrees in the isotopes ^{235}U and ^{234}U. The process of uranium enrichment progressively removes the isotope ^{238}U from the others, so that a by-product of the process is uranium depleted in ^{235}U (and ^{234}U); this is known as depleted uranium and consists almost entirely of ^{238}U. The percentage of ^{235}U in depleted uranium is approximately 0.25-0.30%, with ^{234}U being present only as a trace (about 0.002%). 59 Application of REPPIR to enriched uranium will be determined by its mass, as set out in Schedule 2. 60 For naturally occurring uranium and depleted uranium, the quantity that determines the application of REPPIR should be taken from Schedule 1. For naturally occurring uranium on a premises, the quantity specified in Schedule 1 for ^{235}U and ^{234}U is 3 GBq. Based on a specific activity of 25.4 Bq mg^{-1}, this corresponds to a mass of approximately 120 kg. For depleted uranium on a premises, the quantity specified in Schedule 1 is 4 GBq. Based on a specific activity of 14.88 Bq mg^{-1}, this corresponds to a mass of approximately 270 kg. As newly separated (i.e. extracted from its ore) uranium 'ages', the activity concentration of its radioactive progeny increases and so these have to be taken into account when deciding on the application of REPPIR (using the quantity ratio - see Part 2 of Schedule 1). However, most progeny take many years to achieve significant activities and so in many circumstances may be disregarded. 61 In the case of uranium ore, all progeny will be in activity equilibrium (so-called secular equilibrium) with the uranium 'parent' and will have to be taken into account when deciding upon the application of REPPIR.
Regulation 3(5)	*(5) These Regulations do not apply in respect of—* *(a) any non-dispersible source;* *(b) any radioactive substance which has an activity concentration of not more than 100Bqg^{-1};* *(c) any radioactive substance conforming to the specifications for special form radioactive material set out in sub-section 2.7.2.3.3. of the UN Model Recommendations on the Transport of Dangerous Goods: Model Regulations ("UN Model Regulations")* ([14]), *as revised or reissued from time to time*

([14]) The Model Recommendations can be found at https://www.unece.org/trans/danger/publi/unrec/rev19/19files_e.html or can be inspected at the offices of the Department of Business, Energy and Industrial Strategy at 1 Victoria Street, London, SW1H 0ET.

	(d) any radioactive substance which is in a package which complies with the requirements for a Type B(U) package, a Type B(M) package or a Type C package as set out in subsections 6.4.8, 6.4.9 or 6.4.10 of the UN Model Regulations respectively.
Guidance 3(5)	62 REPPIR does not apply to the particular radioactive sources and substances (a-c) as it is highly unlikely that a radiation emergency could occur in these situations. Operators need not take account of these when calculating the quantity ratio to establish whether REPPIR applies to their premises. Assessments to identify hazards and evaluate risks from such sources will instead be undertaken under the 2017 Regulations and the Management of Health and Safety at Work Regulations (MHSWR) [20]. 63 Even though REPPIR does not apply to these sources and substances there are still requirements to prevent radiation accidents (as defined in the 2017 Regulations), limit consequences of radiation accidents, draw up contingency plans, and rehearse contingency plans at suitable intervals under the 2017 Regulations. **Sealed sources manufactured to Special Form** 64 Special form radioactive material, as defined in the ADR2019 (ADR is a European Agreement Concerning the International Carriage of Dangerous Goods by Road) [21] and invoked by CDG, is exempt under regulation 3(5)(c). This is due to the certified robustness of their encapsulation that prevents dispersion under internationally defined test conditions. 65 This exemption is no longer valid where the special form certification has either expired or has been withdrawn by the relevant competent authority. Where special form certification is no longer valid only because the certification period has expired, then these sources should be considered as 'sealed sources' and may be assessed as non-dispersible sources following the guidance below. Where special form certification has been withdrawn, then the reasons for withdrawal should be considered for relevance to whether the source may still be considered as a sealed source for the purposes of the non-dispersibility assessment described below. For exemption under regulation 3(5)(c), sources must have a valid certification of special form. **Non-dispersible sources** 66 Non-dispersible sources (see definition of 'non-dispersible source' in regulation 2(1)), as demonstrated by the operator, are exempt under regulation 3(5)(a). This is due to the robustness of their design that prevents dispersion under internationally defined test conditions (sealed sources) or conditions assessed by the operator (sources not considered as sealed). 67 Operators who consider that a radioactive substance that they are using is non-dispersible could complete an assessment under MHSWR to confirm that this is the case. **Making a case to demonstrate that a source is non-dispersible under Regulation 3(5)(a).** **Sealed sources manufactured to International Organisation for Standardisation (ISO) 2919 standards** 68 A sealed source whose fabrication is compliant with the current ISO2919 [22] standard for the manufacture of sealed sources [which contains sealed source performance tests for the protection against the release of radioactive material] may be considered to be non-dispersible with respect to these Regulations under the following conditions: (a) Manufacture of the sealed source complies with the general requirements detailed in ISO2919;

(b) The source fabrication meets the classification and performance requirements in ISO2919 that are appropriate to demonstrate non-dispersibility of the radioactive materials contained for category of usage of that source.
(c) Where one is specified by the manufacturer, it is within its recommended working life*, or where it is beyond its recommended working life and the manufacturer is able to confirm that it is not aware of experience of encapsulation failing for that particular design of sealed source; and
(d) The source has undergone routine maintenance, inspection and testing, and the environmental conditions in which the source has been kept since manufacture have been maintained in accordance with the manufacturer's instructions.

* The recommended working life is the period of time within which the manufacturer expects the source to meet its stated performance requirements under design conditions of environment and usage. Recommended working life is often referred to by an equivalent term by different manufacturers but for the purposes of REPPIR, has the same meaning.

Other Non-Dispersible Sources

69 For sealed sources that are not special form radioactive material or sealed sources that do not meet the requirements of paragraph 68 referring to ISO standards above, the operator should make a case to show that in situations or events that challenge its integrity, that there will be no dispersion of radioactive substances.

70 For sources not considered as sealed sources (e.g. un-encapsulated sources) that might nevertheless be considered to be non-dispersible, the operator should make a case to show that in situations or events that challenge its integrity, that there will be no dispersion of radioactive substances.

Making the Case for Non-Dispersibility

71 To make the case for non-dispersibility, the operator should first decide which non-routine situations or events should be considered that might affect the integrity of the source or radioactive material. These events or situations can be grouped according to their impacts, for example, events/situations that involve fire, chemical or physical trauma or a combination of these.

72 Operators should firstly consider which of these impacts is possible on their premises; for example, if there are no circumstances by which a source or radioactive material might come into contact with a corrosive atmosphere or a corrosive substance, then these impacts need not be considered. An operator should consider the feasible extent of potential impacts; for example the maximum likely temperature of a fire due to the materials held on the premises.

73 The operator should then carry out an assessment to determine dispersibility using the flow diagram in Appendix 1, Figure 1, taking into consideration those impacts.

74 Overall it should be the robustness and/or chemical inertness of the source or radioactive substances that forms the basis of the case rather than the exposure risk that results from a 'dispersive' event such as a fire, although this is a relevant factor. As a general rule, only solid, non-combustible radioactive substances or radioactive substances that are encapsulated in solid, non-combustible materials should normally be considered worth assessing for their non-dispersibility.

75 Specialist assistance should be sought to complete the assessment either from the source manufacturer or an appropriately qualified person in the case that the operator does not have sufficient expertise.

76 A record of the assessment should be retained for the period in which the operator has the non-dispersible source on their premises. Operators should review their assessment at least every three years.

	Radioactive substances not more than 100 Bq g^{-1} 77 REPPIR does not apply to any radioactive substance on a premises which has an activity concentration of less than 100 Bq g^{-1}. These radioactive substances are generally naturally occurring low specific activity materials such as zircon sands. **Radioactive substances in Type B(U), B(M) or C transport packages** 78 REPPIR does not apply to any radioactive substance on a premises which are contained in these types of transport packages. However, if the radioactive materials are removed from the package at any time, for example to be used, tested or inspected, then the dis-application no longer applies.

Regulation 4 Hazard evaluation

Guidance 4	79 Identifying hazards, evaluating risks, and preventing emergencies from occurring through appropriate control measures are fundamental to all health and safety legislation, and these requirements are included in REPPIR. Preventing radiation emergencies requires a comprehensive legal framework to manage the control of exposure to ionising radiation, through a range of engineering and administrative controls, and this is provided by the 2017 Regulations which also apply to all work activities covered by REPPIR. However, the main purpose of REPPIR is that if these control measures fail and a radiation emergency occurs, then proportionate emergency arrangements are in place to mitigate the consequences of the emergency. 80 The expectation for commensurate emergency planning is consistent with the IAEA Specific Safety Requirement document for the Safety of Nuclear Power Plants: Design SSR-2/1 [23]. This requires a defence in depth approach to safety applied at five levels, which should be, so far as is reasonably practicable, independent from one another. The fifth and final level of defence in depth is to mitigate the radiological consequences of radioactive releases that could potentially result from emergency situations. This requires the provision of adequately equipped emergency response facilities and emergency plans and emergency procedures for on-site and off-site emergency response. 81 Regulation 4 requires the operator to carry out an evaluation to identify the hazards from their work with ionising radiation which have the potential to cause a radiation emergency. Having identified these hazards, the operator is then required to make arrangements to prevent any radiation emergency and to limit the consequences of any such emergency that occurs. Operators can use existing risk assessments prepared under 2017 Regulations or safety cases produced under NIA to meet the requirements of Regulation 4 providing these do not discount hazards from having the potential to cause a radiation emergency on the basis of low likelihood of occurrence. 82 Where Regulation 4 identifies that a hazard can potentially lead to a radiation emergency, its consequences should be compared with the REPPIR Impact Table (Appendix 2, Figure 1) and its likelihood compared with the REPPIR Likelihood Table (Appendix 2, Figure 2) for input into the REPPIR risk framework (Appendix 2, Figure 3) to establish whether that particular hazard requires a detailed emergency planning zone (and possibly an outline planning zone for premises regulated by HSE). 83 Use of the REPPIR risk framework allows the results for each hazard to be collated and the most serious hazards selected to give a suitable and sufficient range of source terms for further more detailed assessment of the consequences under Regulation 5. Regulation 5 requires a standardised radiological consequence assessment in accordance with Schedule 3 to determine the recommended geographical extent for the detailed

	emergency planning zone and (where applicable) the outline planning zone. 84 An overview of the complete assessment process is given in the Hazard Evaluation and Consequence Assessment flow diagram (Appendix 2, Figure 4) which indicates how the regulations, ACOP, and sections of guidance apply. This diagram does not replace or amend and requirements within the regulations or ACOP but illustrates some of the considerations necessary, steps which may be taken, and likely outputs in order to achieve compliance.
Regulation 4(1)-4(4)	*(1) The operator of any premises to which these Regulations apply must make a written evaluation before any work with ionising radiation is carried out for the first time at those premises.* *(2) The evaluation required under paragraph (1) must be sufficient to identify all hazards arising from the work undertaken which have the potential to cause a radiation emergency.* *(3) Where the evaluation required under paragraph (1) does not reveal any hazards having the potential to cause a radiation emergency, reasons for such a conclusion should be set out in that evaluation.* *(4) Where the evaluation required under paragraph (1) does reveal the potential for a radiation emergency to occur, the operator must take all reasonably practicable steps to—* *(a) prevent the occurrence of a radiation emergency; and* *(b) limit the consequences of any such emergency which does occur.*
ACOP 4(1)-4(4)	**85 The hazard evaluation should determine:** **(a) the potential consequences of each radiation emergency in terms of the effective dose (and where relevant, equivalent dose to the thyroid) to the most exposed persons outside the premises assuming no urgent protective actions are implemented, and** **(b) the likelihood of the consequence occurring.** **86 Evaluating a low likelihood for a radiation emergency to occur should not be used as a reason for discounting the hazard from having the potential to cause a radiation emergency. Operators should consider the possibilities for radiation emergencies with extremely low likelihoods but with significant or catastrophic consequences.** **87 Where the hazard evaluation concludes there is no hazard with a potential to cause a radiation emergency there is no need to perform a consequence assessment under Regulation 5. The justification for such a conclusion should be based on the limited radiological consequences of any hazard (which should be less than 1 mSv effective dose over the period of a year).** **88 Where the hazard evaluation concludes there is a potential for one or more hazards to cause a radiation emergency the operator should collate the results of the hazard evaluation for input into the REPPIR risk framework (Appendix 2, Figure 3) to support the consequence assessment required under regulation 5.**
Guidance 4(1)-4(4)	**Requirement for a written hazard evaluation** 89 Where Regulations 4(1) and 4(5) require that an operator undertakes a hazard evaluation before any work with ionising radiation is carried out for the first time or in relation to the continuation of any work with ionising radiation after the coming into force of these Regulations, it is referring to: (a) existing and new operators who plan to first start work with radioactive

materials to which these Regulations apply;

(b) operators who take on responsibility for existing premises to which these Regulations apply and therefore have such responsibility for the first time, unless they can show by a review that they both understand the hazards from the premises and the hazards have not changed;

(c) operators that wish to increase their inventories to amounts that will become above the thresholds in Schedules 1 or 2 (i.e. new premises in REPPIR) for the first time; and

(d) operators that were undertaking work to which these Regulations apply prior to these Regulations coming into force, noting the transitional provision in regulation 28;

Identifying all hazards with the potential to cause a radiation emergency

90 Regulation 4(2) requires all operators to identify all hazards* that have the potential to cause a radiation emergency resulting in the need for prompt action to mitigate exposure to radiation from inhalation, ingestion, and direct radiation including criticality emergencies and direct exposure from ground contamination. This requirement covers events of very low probability that may or may not have been considered within the design of the installation.

* In Regulation 4(2), the term "hazard" is being used to refer to the non-routine situation or initiating event that has the potential to cause a radiation emergency.

91 The process for identifying potential radiation emergencies should be systematic, comprehensive and auditable, and should include:

(a) significant inventories of radioactive material (i.e. greater than the quantities in Schedule 1) and also any radioactive sources that have not been exempted on grounds of being non-dispersible sources under Regulation 3(5) that may be lost or damaged;

(b) planned operating modes and configurations, including shutdown states, decommissioning operations, and any other activities with the potential to cause a radiation emergency;

(c) chemical and other internal hazards, man-made and natural external hazards, internal faults from plant failures and human error, and faults resulting from interactions with other activities on the premises.

92 The evaluation should cover all potential radiation emergencies. These range from a non-routine situation or an event (see the guidance on the definition of 'radiation emergency' for regulation 2(1)), including a perceived risk, that may not result in any radioactive release, up to events associated with very large radioactive releases resulting in severe or very severe consequences corresponding to the significant and catastrophic regions of the REPPIR risk framework (see Appendix 2, Figure 3). The evaluation should take account of both chronic (long-term) and acute (short-term) consequences following an accidental release of radioactive substances.

93 The evaluation should include possible plant and equipment failures, breakdown of administrative arrangements, and human error. The extent and detail of the evaluation should reflect the likelihood and severity of the potential radiation emergency, and the findings should be recorded. The evaluation should use appropriate techniques for hazard identification and risk assessment. For operators with complex premises or those which contain large radioactive inventories with the potential for serious consequences this may include the use of such techniques as;

(a) Failure Modes and Effects Analysis (FMEA);
(b) Hazard Operability Analysis (HAZOP);
(c) Hazard Assessment Methodology (HAZAM);
(d) fault tree and event tree analysis;
(e) Quantified Risk Assessment (QRA); and

(f) Probabilistic Safety Analysis (PSA).

94 This is likely to be the case for operators of nuclear premises licenced under the Nuclear Installation s Act 1965 (NIA) and authorised defence sites.

95 Consideration of the ways in which the installation or equipment could fail or be damaged should not be limited to activities resulting from the work itself (such as failures of equipment). It should also consider internal hazards that occur within the premises/installation/ system (such as fire, explosions, pressure part failure, flooding, dropped loads) and external events that originate from outside the premises (such as earthquakes, severe weather, hazards from nearby premises and aircraft crashes). The operator's evaluation needs to identify those hazards that are relevant to their premises for example, a tsunami would not need to be considered if the installation is located far inland.

96 Rigorous application of risk assessment frameworks required under HSWA, the 2017 Regulations, MHSWR, and NIA (through Licence Condition 23 which requires an adequate safety case) should ensure that the predicted risks from fault sequences leading to significant radiological consequences are very low. Nevertheless, it is important that operators consider possibilities such as the risk assessment may be incorrect or incomplete; the true severity of an external hazard may exceed that considered in the analysis; or a safety measure could be circumvented or fail in some unpredicted way. This is especially true for operators of premises with large radioactive inventories or complex installations where the radioactive inventory is not passively stored. The insights gained from such analysis are important for planning for the possibility of very severe radiation emergencies and are used to inform the response activities that would be needed were such an emergency to occur.

97 Fault states, scenarios and sequences that have the potential to lead to a very severe radiation emergency should be analysed (In the nuclear sector such sequences are sometimes referred to as beyond design basis events as they may not have been considered when the installation was originally designed). The analysis should through a systematic approach, evaluate scenarios arising from the circumstances listed in the previous paragraph. States and scenarios should not be dismissed from the analysis on the basis of likelihood alone. The analysis should not be concerned with what was the cause of the severe radiation emergency. It should instead adopt a "cause agnostic" approach that focuses on what are the consequences of such severe radiation emergencies and the implications for outline planning purposes.

98 Undertaking such analysis is not proportionate for all types of installations and premises, as not all of them present hazards of sufficient magnitude to warrant severe accident analysis. However, such analysis is beneficial for installations presenting the highest hazards. For example operating reactors, spent fuel storage installations and installations storing significant quantities of nuclear matter which are capable of giving off-site doses in the significant and catastrophic regions of the REPPIR risk framework (see Appendix 2, Figure 3).

99 For some operators, potentially including those that operate non-nuclear premises, it may not be necessary or proportionate to perform a full scope evaluation of the consequences providing the operator can demonstrate that the unmitigated radiological consequences from a bounding hazard analysis case are in the limited region of REPPIR risk framework (see Appendix 2, Figure 3) as discussed in the following section.

Evaluating the consequences of each radiation emergency

100 Through the hazard evaluation, the operator will need to identify what the consequences would be if an identified radiation emergency occurred. For example in the nuclear sector transient analysis or other analyses will normally be carried out, when appropriate, to provide an adequate understanding of the behaviour of the installation

under fault conditions. The evaluation should determine the nature, form and quantity of radioactive material that would be released (the source term or terms*). These source terms should be retained as they directly feed the consequence assessment required by Regulation 5(1) and Schedule 3.

* See Schedule 3 for full definition of a 'source term'.

101 For fault sequences that lead to a release of radioactive material or to exposure to direct radiation, an initial radiological consequence analysis should be performed to determine the effective dose (and where relevant, equivalent dose to the thyroid) to the most exposed persons outside the premises. The assessment should be performed on a suitably conservative and consistent basis to ensure all potential radiation emergencies are identified in a systematic manner. For a radioactive release it should be assumed that the person is directly downwind of an airborne release at the distance of greatest dose or as a result of exposure to direct radiation at the location off-site which gives the greatest dose. No urgent protective actions should be assumed. Where an operator is looking to demonstrate there is no hazard with the potential to cause a radiation emergency in line with the requirements of regulations 3(2) and 4(3) the annual effective doses will need to be calculated and no long term protective actions should be assumed. The ingestion dose over this period should therefore be considered.

102 The radiological consequence assessments may be taken directly from existing risk assessments for the 2017 Regulations or safety cases produced under NIA if they are suitable and sufficient and available for the purpose. These existing radiological consequence assessments can then be used to meet the requirements of Regulation 4 to demonstrate either:

(a) that there is no hazard with a potential to cause a radiation emergency as required under Regulation 4(3) due to the limited radiological consequences of any hazard being less than 1 mSv effective dose over the period of a year; or

(b) that all reasonably practicable steps have been taken to prevent the occurrence of a radiation emergency and to limit its consequences under Regulation 4(4) and to compare the effective dose against the Impact Table (Appendix 2, Table 1). The impact in terms of effective dose is then input into the REPPIR risk framework (Appendix 2, Figure 3) as referenced in ACOP for Regulation 4 together with the associated likelihood for the radiation emergency (see paragraph 119-122). This will determine the representative range of radiation emergencies to be used, and the associated source terms to be input into the more detailed radiological consequence assessment required under Regulation 5(1) and Schedule 3. This information will in turn be used to determine the recommended distances for detailed emergency planning and outline planning where applicable.

103 The hazard evaluation should consider the potential for events that could affect several installations and activities concurrently, as well as consideration of the interactions between the installations and activities, such as through either a common cause or a domino effect. Thus, depending on the nature of the premises in question, the evaluation may identify a number of different events ranging from individual failures on a single installation (leading to single source term) to multiple failures resulting from, for example, seismic events which damage several facilities (leading to several different source terms).

104 The hazard evaluation should also identify non-radiation related hazards to people on-site and off-site that are associated with the installation or activity and that may impair the effectiveness of or change the protective action to be taken. This may include the potential for hazards associated with explosion, fire, chemical releases, severe weather, and persons self-evacuating.

105 For some operators it may be possible for the operator to consider the unmitigated radiological consequences from a single bounding hazard analysis case providing it can be demonstrated that the consequences are limited. Such an assessment should consider a bounding radiation emergency (for example a fire that results in the release of the entire radiological inventory in the premises) that can be used to demonstrate that the consequences lie in the lower region of the REPPIR risk framework (Appendix 2, Figure 3). Here only outline planning is required, for which contingency planning under the 2017 Regulations should be sufficient. In such circumstances the operator may choose to use PHE datafiles [15] to simplify the consequence assessment as discussed further in paragraph 635.

Justification that no hazard has the potential to cause a radiation emergency

106 Regulation 4(3) requires an operator to include a justification in the hazard evaluation when there are no hazards with the potential to cause a radiation emergency. In such circumstances, the operator is not required to perform a consequence assessment under Regulation 5 and the remaining regulations do not apply.

107 One means of meeting the requirement of Regulation 4(3) is to use the radiological consequence assessment discussed in the previous section. For most large nuclear operations, this is unlikely to be the case. However, for static, non-nuclear operations, it may well be that the radiological consequence assessment performed in support of the hazard evaluation required under Regulation 4(2) demonstrates that a radiation emergency is not possible as any release is less than 1 mSv meeting the expectations of the ACOP for regulation 4. When considering whether a radiation emergency is possible, any urgent protective actions (such as the administration of stable iodine tablets) should be disregarded, although longer term recovery action may be taken into account.

108 Another means of demonstrating the requirements of Regulation 4(3) are met is to review the assumptions under pinning the quantities given in Schedule 1 to demonstrate the requirements of Regulation 3(2) are met. The values listed in Schedule 1 are such that, if released in a radiation emergency with no protective actions implemented, could result in members of the public receiving effective doses of ionising radiation of, or in excess of, 1 mSv during the first year after the event. However, the operator's assessment may be able to justify, by modifying some of the parameters assumed by the PHE analysis (that underpinned the development of Schedule 1) with premises specific information, that doses to members of the public will not be in excess of 1 mSv. For example, the off-site doses depend on the release height and the distance to the premises boundary which may vary from those assumed in the analysis for Schedule 1. As noted in paragraph 52(a), PHE have prepared datafiles [15] that simplify such assessments.

109 Another means of demonstrating the requirements of Regulation 4(3) are met is to consider the physical form of the radioactive substance as this is a key factor in whether an incident is likely to lead to a radiation emergency. If the radioactive substance is a gas, then all of the material is likely to be released following a radiation emergency. If the radioactive substance is a liquid or dispersible solid, then only part of the material might be released during a radiation emergency. If the radioactive substance is a non-dispersible solid, then only a small part of the total quantity is likely to be released during a radiation emergency, even if that emergency is a fire. If the quantity of radioactive substance likely to be released is greater than that in Schedule 1, the incident would fulfil the criteria for a potential radiation emergency. The types of questions that need to be answered are essentially the same as those that arise when a radioactive substance is being assessed for non-dispersibility - Appendix 1 is therefore relevant. Once the decision has been made as to the likely fraction of activity that would be released, the dose consequences for members of the public in the year following an atmospheric release, such as may arise as a result of a fire, can be estimated from the values tabulated in Schedule 1. These values reflect conservative release and occupancy scenarios (Schedule 1).

Radiation Emergencies due to a perceived risk arising from an event

110 For radiation emergencies due to a perceived risk arising from an event, operators should consider what the perception of any identified non-routine situation or event would be, including but not limited to members of the public off-site. For example, a non-routine situation or event may appear abnormal to off-site observers. Although, the evaluation may show that off-site consequences do not exceed an effective dose of 1 mSv over the first year (assuming no urgent protective actions), the indication of an abnormal condition may mean that some off-site communication plan, such as informing local emergency services of the nature of the event may be required. This is to avoid, for example, unnecessary or detrimental action amongst the local population being taken as a result of the perceived risk. An example of this is a fire that does not affect significant quantities of radioactive material, but results in palls of smoke and the attendance of local emergency services. However, due to the off-site consequences not exceeding 1 mSv there is no need to consider such an event in the consequence assessment performed under Regulation 5(1). There is no need to do an explicit hazard evaluation for these events. Instead, it is important to recognise this potential and ensure that emergency plans lead decision makers to recognise the symptoms and communicate with stakeholders in a timely manner to prevent escalation of the perceived risk.

Radiation Emergencies resulting in serious consequences to human life, health and safety, quality of life, property and the environment

111 In practice the radiological dose consequence assessments evaluated above can be used as a surrogate for determining whether a hazard can cause a radiation emergency resulting in serious consequences to human life, health and safety, quality of life, property and the environment based on the risk framework descriptors (Appendix 2, Figure 3) and the Impact Table (Appendix 2, Figure 1) presented in the ACOP for Regulation 4. The Impact Table shows that each of the serious consequences that define a radiation emergency are effectively bounded by the 1 mSv effective dose over a year ensuring that hazards that can lead to these serious consequences should be accounted for in the hazard evaluation performed under Regulation 4(2).

Preventing radiation emergencies and limiting their consequences

112 Where the hazard evaluation identifies a hazard which may cause a radiation emergency, Regulation 4(4) requires the operator to take all reasonably practicable measures to prevent the hazard manifesting itself in the first place by, for example, limiting or eliminating holdings of radioactive materials. Where these measures cannot completely rule out the possibility of a radiation emergency occurring, then all reasonably practicable measures should be taken to reduce its consequences.

113 Steps to prevent radiation emergencies and limit their consequences are likely to comprise of a combination of measures relating to the physical design and control of the plant and equipment, processes and operating limitations, availability of back-up equipment and supplies to be used when an emergency occurs, and management structures and systems.

114 Measures to minimise the possibility of plant and equipment failures may include incorporating plant and equipment with high technical specifications, reliability requirements, and, where appropriate, seismic qualification. Measures to limit the consequences of any failures may include defence in depth incorporating redundancy and diversity where appropriate, physical layout of the installation and locations of occupied areas, additional shielding, installation of emergency detection mechanisms, and provision of extra containment. These are introduced most cost effectively at the design stage.

115 The success of administrative arrangements for prevention and mitigation can be maximised by considering the needs of employees and by providing adequate

documented procedures, maintenance and testing regimes, monitoring systems, training, staffing arrangements and supervision for both routine operations and during a radiation emergency. Some operators will also need to consider specific arrangements to recognise and manage events that may be considered as extremely unlikely but have significant consequences.

116 The extent of the measures taken to reduce and mitigate the risks will reflect the likelihood and severity of the potential radiation emergency.

117 The operator may need to seek appropriate advice on topics such as engineering, fault analysis, radiological consequence assessment, radiological protection, and human factors when making arrangements to prevent potential radiation emergencies and to limit the consequences which may occur.

118 Operators need to clearly demonstrate what measures have been taken. Some operators will have extant requirements to do this, for example in the safety cases required of nuclear operators by the site licence conditions under the NIA.

Evaluating the likelihood of each radiation emergency

119 Evaluating the likelihood of potential radiation emergencies is important in relation to ensuring a proportionate overall approach to emergency planning. It provides valuable context in relation to operator's decisions on the reasonably practicable steps required to prevent and limit the consequences (Regulation 4(4)), and is an essential input into the consequence assessment (Regulation 5(1)) through use of the REPPIR risk framework. However, given the requirement in REPPIR to consider events of very low probability that may or may not have been considered within the design of the installation, evaluating a low likelihood of a hazard occurring should not be used as a reason for discounting the hazard from having the potential to cause a radiation emergency.

120 For each initiating event, potential fault sequences representing how the emergency progresses should be developed and their potential consequences analysed. Initiating events leading to fault sequences protected by the same safety systems and equipment, and resulting in similar consequences, should be grouped, and their associated sequence frequencies summed. These summed sequence frequencies for the consequence to occur are to be compared against the REPPIR Likelihood Table (Appendix 2, Figure 2) for input into the REPPIR risk framework (Appendix 2, Figure 3) referenced in the ACOP for Regulations 4 & 5. The source term selected to represent the group of sequences should be the most limiting one in terms of the radiological dose. The timescales taken for a release to occur should also be the most limiting. It is important that the frequencies of similar sequences should be summed together and not subdivided as this could otherwise potentially evade the requirements for a detailed emergency planning zone identified in the REPPIR risk framework (Appendix 2, Figure 3).

121 Best estimate methods and data should be used as far as possible in the hazard evaluation for determining likelihood of the initiating events. Reliability data based on actual maintenance records from the installation should be used as far as possible for the calculation of the failure probabilities. However where such data is not available, use of generic reliability data compiled for the relevant industrial sector may be acceptable provided its applicability is justified and the data sources selected are used in a consistent and systematic manner. Where neither installation specific nor generic reliability data is available, use of expert judgement may be acceptable, provided that the basis for the judgement is justified and documented, and careful consideration given to the impact of these judgements on the results when input in to the REPPIR risk framework (Appendix 2, Figure 3).

122 For some operators it may not be necessary to quantify the likelihood of a radiation emergency in terms of a numerical probability providing the operator can demonstrate that the unmitigated radiological consequences from a bounding hazard analysis case are limited as discussed in paragraph 105. Instead a qualitative approach may be adopted in

which events are allocated to qualitative categories based on expert judgement. The basis for such judgements needs to be justified and documented and careful consideration needs to be given to the impact of these judgements when compared against the REPPIR Likelihood Table (Appendix 2, Figure 1) for input in to the REPPIR risk framework (Appendix 2, Figure 3). For the purposes of REPPIR six suitable qualitative descriptors based on the national risk assessment (NRA) [24] that may be applied are: "very high", "high", "medium", "low", "very low" and "events not considered in the design". These are presented in the REPPIR likelihood Table (Appendix 2, Figure 2) together with the equivalent quantitative descriptors from the national risk assessment which considers the likelihood of the event occurring within the next five years.

The REPPIR risk framework

123 Following the evaluation of hazards performed under regulation 4(2), the operator should have identified a full range of radiation emergencies that are possible at the premises together with the likelihood for each radiation emergency to occur and its associated consequence in terms of a source term and an effective dose (the latter, where appropriate, taken from either the 2017 Regulations risk assessment or a safety case produced in response to NIA). The next step of the assessment process is for the operator to assess these potential radiation emergencies using the REPPIR risk framework presented in Appendix 2, Figure 3.

124 The REPPIR risk framework is a risk matrix based on the national risk assessment with axes for impact and likelihood for a radiation emergency. It provides a graded approach for sentencing radiation emergencies gradually transitioning from requiring regulatory action to prohibit or curtail an activity as well as detailed emergency planning and outline planning; through to requiring detailed emergency planning and outline planning, then only requiring outline planning; and finally not requiring any emergency planning.

125 The radiological consequence assessments which are input into the REPPIR risk framework (Appendix 2, Figure 3) may be taken directly from existing risk assessments for the 2017 Regulations or safety cases produced under NIA if they are suitable and sufficient and available for the purpose. These existing radiological consequence assessments are input into the REPPIR risk framework together with the associated likelihood for the radiation emergency. In paragraphs 132 & 145 it is explained how this should be used to determine a full range of radiation emergencies together with their associated source terms to be input into the more detailed radiological consequence assessment required under Regulation 5(1) and Schedule 3. This information will in turn be used to determine the recommended distances for detailed and outline planning where applicable.

126 The impact axis of the REPPIR risk framework corresponds to the national risk assessment and has five qualitative descriptors that are:

- limited,
- minor,
- moderate,
- significant, and
- catastrophic.

127 These qualitative descriptors correspond to effective dose for the most exposed person outside the premises. These are

- 1 mSv and below,
- 1 mSv to 10 mSv,
- 10 mSv to 100 mSv,
- 100 mSv to 1000 mSv, and
- 1000 mSv and above.

128 As noted earlier the likelihood axis has six qualitative descriptors that are:

	• very high, • high, • medium, • low, • very low, and • events not considered in the design. 129 These correspond to the equivalent quantitative descriptors which are taken directly from the national risk assessment which consider the likelihood of the event occurring within the next five years. These are: • 1 in 2 or higher, • 1 in 20 to 1 in 2, • 1 in 200 to 1 in 20, • 1 in 2000 to 1 in 200, • 1 in 20,000 to 1 in 2,000, and • less than 1 in 20,000. 130 The final quantitative descriptor covers low probability events potentially not considered within the design. 131 The value of 1 in 20,000 in a five year period represents the lowest likelihood considered in the national risk assessment and so it is taken to be appropriate to use this as the lowest likelihood for which detailed emergency planning should be required and the point at which outline planning (or even no emergency planning in the case of low consequence events) is sufficient. **Collating results into the REPPIR risk framework** 132 For each radiation emergency the results of the hazard evaluation consisting of its consequences in terms of the effective dose to the most exposed persons outside the premises and its associated likelihood should be collated and input into the REPPIR risk framework (Appendix 2, Figure 3). In complex cases the evaluation may lead to many sequences that for the purposes of practical analysis may be grouped together as a number of fault groups such that not every individual fault needs to be evaluated. This can be achieved through the use of one or more representative but bounding set of doses and frequencies according to common characteristics such as similar initiating events, common facilities or equipment, or common consequences. The differing characteristics to be considered by the operator should also include different time frames associated with a release, and differing combinations and quantities of radionuclides involved. **Recording the written evaluation** 133 The written evaluation providing the details of the hazard evaluation is expected to be kept for the period of its applicability and at least for 3 years from the date on which it was made.
Regulation 4(5)-4(6)	*(5) The evaluation required by paragraph (1) also applies to the continuation of any work with ionising radiation carried out by an operator after the coming into force of these Regulations.* *(6) The requirements of this regulation are without prejudice to the requirements of regulation 3 (risk assessment) of the Management of Health and Safety at Work Regulations 1999 ([15]) and to regulation 8 of the 2017 Regulations.*

([15]) S.I. 1999/3242. Regulation 3 was amended by S.I. 2003/2457, 2005/1541, S.S.I. 2006/457, S.I. 2015/21 and S.I. 2015/1637.

Guidance 4(6)	134 The 2017 Regulations, regulation 8(1)-8(4), requires all relevant employers to undertake a thorough risk assessment of all hazards with the potential to cause a radiation accident, identify the risks, and take all reasonably practicable steps to prevent such accidents and limit their consequences. This is analogous to the requirements in regulations 4(1)-4(4) above. Thus some of the requirements of REPPIR are already addressed by these existing risk assessments prepared under the 2017 Regulations. Likewise, for a nuclear operator, some of the requirements of these Regulations are already covered by existing nuclear site licence conditions under NIA. These include requirements relating to hazard identification and risk evaluation covered by safety cases. The operator's NIA safety cases will therefore be a significant source of information for the purposes of these Regulations. In such circumstances, requirements met under the 2017 Regulations or NIA should satisfy equivalent requirements under REPPIR and it will not be necessary to duplicate information. Instead the relevant documents may be cross referenced within the evaluation report.
Regulation 4(7)	*(7) The operator must provide the regulator with details of the evaluation made under paragraph (1) within 28 days of the date on which it is made.*
Guidance 4(7)	135 The details of the evaluation required under Regulation 4(1) should where appropriate reference out to supporting references providing detailed information of the following particulars, where relevant: (a) the name and address of the operator; (b) the postal address of the premises where the radioactive substance will be processed, manufactured, used or stored, or where the facilities for processing, manufacture, use or storage exist; (c) the date that the work with ionising radiation will commence or, if it has already commenced, a statement to that effect; (d) a general description of the premises; (e) a description and details of any radioactive substance on the premises which is likely to exceed any quantity or mass specified in Schedule 1 or Schedule 2; (f) a plan of the premises in question and a map of the environs; (g) a summary description of any plant(s) or enclosed system(s) containing more than the quantity or mass of any radioactive substance specified in Schedule 1 or Schedule 2, and the nature of the containment for the radioactive substance; (h) those hazards which could precipitate a release of any radioactive substance and the safety measures to be taken to prevent and control such a release; (i) those hazards which could give rise to an incident involving the initiation of an unintended self-sustaining nuclear chain reaction or the loss of control of an intended self-sustaining nuclear chain reaction and, in either case, the safety measures to be taken to prevent and control any such incident; (j) information concerning the management systems and staffing arrangements relevant to the control of any radioactive substance; (k) a summary description of the hazards identified; (l) the results of the analysis against the risk framework including for each radiation emergency identified; justification for the grouping together of any fault groups, the off-site effective dose to the most exposed persons, the likelihood for the consequences to occur, and the associated source term in a suitable form. 136 The operator should where relevant provide such source terms as referred to above in a form suitable for use in the UK national emergency response arrangements. 137 Sufficient records should be kept of the results of the evaluation, including in cases where it is concluded there is no potential for a radiation emergency, to allow for external verification. 138 All operators must send the details of their hazard evaluation to the relevant

	regulator (see Regulation 2) within 28 days of completing the evaluation. For defence nuclear sites, where the technical information specified above is sensitive nuclear material specifically associated with a nuclear warship or nuclear weapon, the details of the hazard evaluation may instead be shared with the Defence Nuclear Safety Regulator (DNSR) who will provide assurance to ONR on the adequacy of the hazard evaluation. 139 The details of the hazard evaluation should contain or provide appropriate cross references to the details required from (a) to (l) as described. The reports submitted should contain sufficient information and, where appropriate, clear and precise cross references for the relevant regulator to be able to easily identify the relevant information and confirm the conclusions reached. The documentation should also have been subject to appropriate quality control procedures before issue. As noted in the guidance for Regulation 4(6), where the requirements complied with under the 2017 Regulations or NIA satisfy equivalent requirements under REPPIR it will not be necessary to duplicate information. Instead the relevant documents may be cross referenced within the evaluation report.

Regulation 5 Consequence assessment

Guidance 5	140 Regulation 5 requires that a full range of hazards identified as having the potential to cause a radiation emergency under Regulation 4 are assessed in a standardised way through compliance with the requirements in Schedule 3. The REPPIR risk framework presented in Appendix 2, Figure 3 is to be used to select on the basis of expert judgement a representative range of radiation emergencies, together with their associated source terms, which are then to be used to perform consequence assessments in accordance with Schedule 3. 141 The results of these consequence assessments are to be used to determine the recommended geographical extent for the detailed emergency planning zone, the requirements for urgent protective action, and where applicable the recommended geographical extent for the outline planning zone. Relevant results from this would then be captured in a consequence report under Regulation 7. 142 For new operators within the scope of these Regulations and premises which may have a detailed emergency planning zone for the first time, operators should engage with the local authority as early as possible in the process, and where possible, significantly prior to sending the completed consequence report.
Regulation 5(1)-5(2)	*(1) Where the evaluation undertaken under regulation 4 reveals the potential for a radiation emergency to occur, the operator must make an assessment, in accordance with Schedule 3, to consider and evaluate a full range of possible consequences of the identified radiation emergencies, both on the premises and outside the premises, including the geographical extent of those consequences and any variable factors which have the potential to affect the severity of those consequences.* *(2) The assessment required by this regulation must be completed within two months after the day on which the hazard evaluation required by regulation 4 is completed.*
ACOP 5(1)-5(2)	**Evaluation of a full range of possible consequences.** **143 To assess a full range of possible consequences the operator should:** **(a) determine a full range of radiation emergencies using the REPPIR risk framework (see paragraph 144);**

	(b) collate the source terms associated with each of these radiation emergencies to create a suitable and sufficient range of source terms; and **(c) undertake the consequence assessment for each of these suitable and sufficient source terms in accordance with Schedule 3.** **144 To determine a full range of radiation emergencies the operator should:** **(a) include a number of the most bounding cases within the detailed emergency planning zone, and where relevant the outline planning zone of the REPPIR risk framework (Appendix 2, Figure 3);** **(b) include a sufficient number of radiation emergencies to enable the operator to demonstrate in a transparent way how it has determined the recommended geographical extents for the detailed emergency planning zone (and where relevant the outline planning zone) and the recommended distances for sheltering, evacuation and the administration of stable iodine tablets; and** **(c) include as sensitivity studies any radiation emergences that lie in the outline planning zone of the REPPIR risk framework but close to the boundary of the detailed planning zone. The sensitivity study should assess what the implications are of increasing the likelihood of a radiation emergency by one order of magnitude.**
Guidance 5(1)-5(2)	**Selecting a suitable and sufficient range of source terms** 145 The operator should use the collated results input into the REPPIR risk framework (Appendix 2, Figure 3) to select a full range of radiation emergencies. A number of the most bounding cases should be selected, and this selection should be justified. Their associated source terms then provide a suitable and sufficient range of source terms for the consequence assessment to be performed in accordance with the requirements of Schedule 3. 146 The exact number of source terms required will vary and depends on the nature and complexity of the premises and the range of hazards that are possible, and so cannot be prescribed and must rely on expert judgement by the operator. These judgements need to be captured in the details of the assessment provided to the regulator. However, the number of source terms selected should be sufficient to meet the overall objective of providing the local authority with sufficient practical information to develop an adequate off-site emergency plan, including where relevant, suitable information to support outline planning. 147 For example, where the premises includes a range of installations with differing radiological inventories such as major spent fuel storage and reprocessing installations, at least one bounding source term should be provided for each major installation for input into the REPPIR risk framework. Such differences in inventories may be relevant to the prompt actions needed to mitigate the consequences. For example, a reactor may be a source of iodine isotopes, but an irradiated fuel store is not. If there are such differences, the consequence assessment should identify whether the differences could make a material difference to the off-site emergency plan. 148 For an operating gas-cooled reactor it may be sufficient to provide source terms for just the reactor and the fuel handling route (including the spent fuel storage installation). However, the range of source terms may need to consider a range of reactor faults such as depressurisation faults and faults that lead to the lifting and reseating of a safety relief valve and/or the consequential depressurisation of the reactor such as boiler tube failure faults, reactivity faults, gag faults, and dropped fuel faults as well as very low probability radiation emergencies such as the long term loss of post trip cooling.

Guidance 5(1)-5(2)	149 In the case of an operating light-water reactor, faults associated with containment by-pass, such as steam generator tube rupture (SGTR) faults, secondary side depressurisation faults with consequential SGTR, or loss of coolant accidents with leakage from containment may need to be considered as well as very low probability radiation emergencies such as complete core melt with late containment failure. It is recognised that modern light-water reactors are designed with the intention of eliminating radioactive releases within the design basis. Nevertheless, given the large hazard potential associated with operating power reactors (LWR, AGR, etc.) there is the expectation that a minimum geographical extent for detailed emergency planning will be nominated by the operator consistent with international standards and guidance produced by the IAEA [25], [23], [26]. This point is generally true across all sectors that for installations with the highest hazards which can result in releases in the significant and catastrophic regions of the REPPIR risk framework there is the expectation that a nominal geographical extent for detailed emergency planning will be recommended even if the analysis indicates this may not be necessary. 150 In contrast a single source term may be appropriate for non-nuclear premises where there is a single source of activity and the material is passively stored or where the only radiation emergency is associated with a criticality event. 151 The key criteria in determining the number and nature of the source terms required is that it should be sufficient to enable the operator to demonstrate transparently how it has determined the recommended minimum planning areas for detailed and, where relevant, outline planning and the recommended distances for sheltering, evacuation and the administration of stable iodine tablets and that it provides the Local Authority with sufficient information to develop an adequate off-site emergency plan. It is also important that when determining the list of source terms, the operator also identifies the timescales associated with the release of each source term as this will also inform the requirements of the local authority off-site emergency plan. **Sensitivity study on the likelihood of a radiation emergency** 152 In the REPPIR risk framework under Regulation 4, the value of 1 in 20,000 in a five year period is the lowest likelihood considered in the national risk assessment (paragraph 131). It is considered to be appropriate to use this as the lowest likelihood for which detailed emergency planning should be required and the point at which outline planning (or even no emergency planning in the case of low consequence events) is sufficient. However, it is recognised that there are always uncertainties associated with the estimation of such low likelihood events. For this reason, as described in the ACOP for Regulation 5, the operator should perform a sensitivity study to see what the implications would be if the predicted likelihood of a radiation emergency that lies in the outline planning region is increased by one order of magnitude. This is to determine whether a small change in this assumption leads to a disproportionate increase in radiological consequences as a result of a radiation emergency with greater consequences moving from the outline planning region into the detail emergency planning region of the REPPIR risk framework. In this case the operator would need to consider the impact of this change on the recommended distances for urgent protection actions and the recommended geographical extent of the detailed emergency planning zone. 153 In making this assessment consideration should also be given to the timescales for a release to occur as if this is likely to be delayed for many tens of hours following the start of a radiation emergency it may be inappropriate to consider it when the setting the distance for an urgent protective action.
Guidance 5(1)-5(2)	**Performing the consequence assessment** 154 Having obtained a suitable and sufficient range of source terms using the REPPIR risk framework the operators should assess these source terms in a standardised way against the requirements set out in Schedule 3. It should be noted that both radiation

emergencies that lead to exposure to direct radiation and/or the release of radioactive material should be assessed. The assumptions set out in Schedule 3 that are relevant to direct radiation exposures and releases of radioactive materials, must be used in the radiological consequence assessment. The extent and detail of the consequence assessment should reflect the likelihood and severity of the potential consequences of the radiation emergency. The complexity of the assessment can be much simpler for low likelihood and/or low consequence events – see guidance for Schedule 3(1)-3(2), paragraph 635.

155 The requirements in Schedule 3 for the consequence assessment include consideration of:

(a) the range of potential source terms and weather conditions;
(b) the different persons that may be exposed;
(c) the effective and equivalent doses they are likely to receive;
(d) the pathways for exposure; and
(e) the distances in which urgent protective action may be warranted for the different source terms when assessed against the relevant Emergency Reference Level (ERL).

156 ERLs are published by PHE [27]. Further guidance on the assumptions to be used to meet the requirements of Schedule 3 including the means of determining the detailed emergency planning zone are provided in the ACOP and guidance for Schedule 3.

157 The assessment of effective doses for persons on the premises under regulation 5(1), will be for relevant groups of employees on the premises that should include, as a minimum, the operator's and their contractors' emergency workers, emergency workers attending from outside the premises such as emergency services with a defined role in the operator's emergency plan, and other employees.

158 The assessment of effective doses for persons outside the premises under regulation 5(1), will be for relevant groups of persons outside the premises that will include members of the public and emergency workers with a defined role in the off-site emergency plan.

159 Although, the effective doses assessed in paragraphs 157 and 158 are not required to be contained in the consequence report made under regulation 7, this information is essential to emergency planning requirements under regulations 18 and 20, and so should be shared, as appropriate, with relevant organisations under regulations13 and 15.

Consideration of uncertainties in the consequence assessment

160 Radiological consequence analyses should include any direct radiation and any inhalation, absorption and ingestion of radioactive material and should also take account of the physical and chemical form of the radioactive material released.

161 For releases, variable factors which have the potential to affect the severity of those consequences relate primarily to weather related conditions, for example, wind speed and direction, raining or dry. Unless specific factors apply, apart from the uncertainties in source terms, and weather variables, consideration of additional uncertainty in the dose assessment such as occupancy/ habits/ inhalation rates (representative averages for the UK are sufficient), dose per unit intake, are unwarranted for emergency planning purposes [28] .

Recording the consequence assessment

162 Operators need to demonstrate, when requested, that the consequences of a full range of radiation emergencies have been assessed and understood, and may be asked for these during routine inspections or in the event of a radiation emergency.

163 Where the consequence assessment forms part of the risk assessment required

	under MHSWR the significant findings of the risk assessment to be recorded, kept up to date, and discussed with affected persons. The record should show a clear and transparent process, resulting in an auditable and demonstrable trail for how the information in the operator's emergency plan and the Consequence Report has been established. 164 The process and record of the findings of the assessment should be sufficient for the relevant regulator to be able to confirm the conclusions reached and be subject to the operator's administrative document control. 165 If the hazard evaluation or consequence assessment leads the regulator to conclude that the consequence assessment is not adequate or is insufficient, and there may be a risk of a radiation emergency arising from the work activities, the regulator may require a further assessment to be carried out. This further assessment may for example be expected to address uncertainties in the methodologies used and the impact of those uncertainties on the effectiveness of protective actions taken to prevent and control any potential radiation emergency.

Regulation 6	**Review of hazard evaluation and consequence assessment**
Guidance 6	166 Regulation 6 requires operators to review, and revise where necessary, their evaluation and assessment made under regulations 4 and 5 whenever a material change to the work with ionising radiation is planned, or is recognised to have consequentially taken place, and periodically within 3 years of the date of the last assessment. This assessment will identify any new hazards, or changes to the hazards already identified, that have the potential to cause a radiation emergency, and the consequences should a radiation emergency occur. 167 ACOP paragraph 173 sets out what should be considered a material change. Planned material changes usually occur as a result of management decisions to change existing work or introduce new work with ionising radiation. Consequential material changes usually occur either in unplanned circumstances, such as changes to the quantities or the physical form of radioactive materials in complex processes, or through changes to methodologies, such as changes in the way hazards and/or consequences are identified or evaluated. 168 The purpose of this review is to ensure that the hazard evaluation and consequence assessment continue to accurately reflect the activities being undertaken on the premises. 169 Operators should consider the possible impact of any proposed modification to their installations and facilities, to the inventories held, or to the working practices undertaken to determine whether these *could* cause a material change. Where this is considered to be the case, the hazard evaluation and consequence assessment must be revised to ensure this continues to accurately reflect the risk from the work with ionising radiation on the premises. 170 Operators should also remain aware of any external developments that may affect the consequence assessment, such as the latest confirmed scientific evidence on the effects of ionising radiation on humans (including introduction of revised radiation weighting factors where they have been modified in national or international standards) or transfer of radionuclides in the environment. It is the operator's responsibility to ensure that the hazard evaluation and consequence assessment reflect current national and international standards.

	171 For premises where a revision to the consequence report is likely to recommend a change to the geographical extent of the detailed emergency planning zone or outline planning zone for premises falling in regulation 9(1)(b), operators should engage with the local authority as early as possible in the process, and where possible, significantly prior to sending the completed consequence report. 172 The requirements for the retention of the written evaluation and assessment made under regulations 4 and 5 continue to apply.
Regulation 6(1)-6(4)	*(1) Where the operator proposes a material change, or where a material change occurs, in the work with ionising radiation to which an operator was required to make an evaluation pursuant to regulation 4(1), the operator must make a further assessment to take account of that change.* *(2) For such time as the work with ionising radiation in respect of which an evaluation made pursuant to regulation 4(1) continues, the operator must, within 3 years of the date of the completion of the last evaluation (whether made in accordance with regulation 4(1) or this paragraph), or longer, if agreed by the regulator, either—* *(a)make a further evaluation; or* *b) if there is no change of circumstances which would affect the last consequences report required by regulation 7, make a declaration to that effect.* *(3) Where a declaration is made in accordance with paragraph (2)(b), a copy of that declaration must be provided to the local authority and to the regulator, within 28 days of the making of the declaration.* *(4) The further evaluation required by this regulation must comply with the provisions of regulation 4(2) to (4), and regulation 5, where applicable.*
ACOP 6(1)-6(4)	**173 Operators should consider a 'material change' as a change in their work with ionising radiation which has the potential to change the nature or scope of the hazards and risks associated with the work which would affect the previous hazard evaluation in a way that may require amendments to:** **(a) the operator's arrangements for the prevention of radiation emergencies or mitigation of the consequences of radiation emergencies;** **(b) the operator's emergency plan; or** **(c) the local authority's off-site emergency plan.** **174 A record of the further evaluation and assessment made under 6(1) and 6(2)(a) should either take the form of updates to the previous details of the hazard evaluation and consequence assessment sent to the regulator under regulations 4(7) and 7(6) respectively, or provide new such records for the premises.** **175 The declaration required by regulation 6(2)(b) should state that the previous consequence report under regulation 7(1) continues to provide the necessary information for the local authority to prepare an adequate off-site emergency plan. The operator will need to demonstrate that there has been no change in circumstances or material change which would affect the previous hazard evaluation or consequence assessment required by regulations 4(1) and 5(1).**
Guidance 6(1)-6(4)	176 Operators should have written arrangements by which the impact of any modifications to their installations, facilities, working arrangements, operating parameters or external impacts are identified and considered. For nuclear operators this will be met by existing arrangements under nuclear site licence condition 22. 177 If there is a change in the work with ionising radiation it will be necessary for the

operator to assess the impact of the change on their previous evaluation and assessment to determine if it is a material change in accordance with paragraph 173. For the purposes of REPPIR, the following are examples of changes which could potentially be material changes:

(a) cessation of that work;

(b) use of different radioactive substances;

(c) use of different quantities of the same radioactive substances;

(d) the decay of high-activity sealed sources to below the levels in Schedule 1;

(e) use of different masses of fissile material;

(f) changes in the physical form of the radioactive substances in use;

(g) use of new or different technologies;

(h) modifications to existing plant and/or technologies;

(i) changes in safety management or safety-critical administrative procedures;

(j) changes to values or application of international or national radionuclide dose coefficients;

(k) identification of new hazards (internal and external hazards) to those previously identified;

(l) identification of different likelihoods of initiating events and/or the consequences;

(m) new or different interpretations or assessment methodologies of existing hazards;

(n) new environmental modelling or dose assessment techniques/ information; and

(o) the potential impact of any future proposed changes at or around the premises, such as significant additional building developments that may impact on the operator's assessment of the geographical extent of the consequences in regulation 5(1). For example, new urban developments in areas where there were not any before and hence no protective actions were recommended. The operator should be aware of such changes through liaison arrangements with the local authority.

178 For high hazard industries significant material changes can occur during the construction and active commissioning of new facilities or the decommissioning of existing facilities. In these circumstances it may be appropriate for the operator to consult the regulator for advice on whether a particular change or group of such changes should be considered to be a material change and thus prompt further assessment before the work continues. In some high hazard industries the operator is required to consult the regulator prior to making any significant changes; these are often referred to as regulatory 'hold-points'.

179 Where reviews have been carried out it is important to ensure the revised evaluation (see regulation 4(7)) and assessment (see regulation 7(6)) have been recorded. Where a review identifies changes to the evaluation of the hazards, likelihood of occurrence, or assessment of the consequences, recording of these should be made either by updating the records relating to the initial hazard evaluation and to the consequence assessment and report, or suitably recording the additional findings.

180 The declaration required by regulation 6(2)(b) should where possible be a standalone document, providing sufficient information to record the basis for this declaration. It should refer directly to the results of the relevant hazard evaluation, consequence assessment and consequence report. It can reference such previous documents that continue to be relevant and any such updates where appropriate.

	181 Unless the operator judges they are needed more frequently, periodic reviews of evaluations and assessments must take place within 3 years of the date of the last evaluation, except where a longer period has been agreed by the regulator. 182 The written records, updates or statement made should be kept for the period of their applicability and for at least 3 years from the date on which they were made. If updates or statement pertaining to the previous records are produced, the previous records should also be retained for at least a further 3 years. The documentation should have been subject to appropriate quality control procedures.

Regulation 7 Consequences report

Regulation 7(1)	*(1) Where the operator has made an assessment pursuant to regulation 5(1) or a review in accordance with regulation 6(1) or 6(2), unless regulation 6(2)(b) applies, the operator must prepare a report setting out the consequences identified by that assessment, called a consequences report, as soon as reasonably practicable on completion of the assessment.*
Guidance 7(1)	183 In addition to the information required under Schedule 4 below, and to support the development of the local authority's off-site plan, the consequence report should include the consequences in terms of doses, timescales and relevant protective actions for the representative range of radiation emergencies identified in the consequence assessment under Regulation 5. Information to support outline planning such as the approximate timescales for such releases to occur and the relevant protective actions that will be required will also need to be provided to the local authority but this may be more appropriately shared through the arrangements made in response to regulation 13 on cooperation between the operator and the local authority.
Regulation 7(2)-7(5)	*(2) The operator must send the consequences report to the local authority—* *(a) before the start of any of the work with ionising radiation to which the assessment relates;* or *(b) where the report is as the result of a review in accordance with regulation 6, as soon as practicable after completion of the report.* *(3) A consequences report must include the particulars set out in Schedule 4.* *(4) Following receipt of the consequences report by the local authority, the operator must, within a reasonable period of time, offer a meeting to the local authority to discuss the consequences report.* *(5) The operator must comply with any reasonable request for information made by a local authority, following receipt of the consequences report, required by the local authority to enable it to prepare the off-site emergency plan which it is required to prepare under regulation 11, within 28 days of the date on which that information was requested.*
Guidance 7(2)-7(5)	184 Further guidance on the requirement under Regulation 7(2) to set out in the consequences report any minimum geographical extent from the premises that should be covered by the local authority's off-site emergency plan is provided in Schedule 4 and its associated guidance. 185 Guidance on the need for co-operation between the operator and the local authority

	is provided in the guidance for Regulation 13.
Regulation 7(6)	*(6) The operator must provide the regulator with details of the assessment made under regulation 5 and the consequences report within 28 days of the date on which the consequences report is sent to the local authority.*
Guidance 7(6)	186 The details of the assessment to be provided to the regulator should where appropriate reference out to supporting references to provide detailed information including the following particulars, where they are relevant: (a) the name and address of the operator; (b) details of the atmospheric dispersion analysis where the radiation exposure is due to a release; (c) the results of the radiological consequence assessment used to determine the recommended minimum geographical extent for detailed emergency planning and the urgent protective actions; (d) the results of the radiological consequence assessment used to determine the recommended minimum geographical extent for outline planning where required to perform the determination required under 9(1)(b); (e) an assessment of how the doses outside the premises vary as a function of time for the purposes of informing practical emergency planning; (f) an assessment of the necessity for an emergency plan to be prepared by the operator**.** 187 All operators must send the details of the assessment to the relevant regulator (see Regulation 2) within 28 days of sending the consequences report to the local authority. The operator may choose to combine the details of assessment with the hazard evaluation prepared under Regulation 4(7). In the case of defence nuclear sites, where the technical information specified in the ACOP for Regulation 7(6) is sensitive nuclear material specifically associated with a nuclear warship or nuclear weapon, the details of the assessment may instead be shared with DNSR who will provide assurance to ONR on the adequacy of the assessment. 188 The details of the assessment should, where relevant, contain the details required from (a) to (f) in paragraph 186 above. The reports submitted should contain sufficient information and cross references for the relevant regulator to be able to confirm the conclusions reached. 189 The documentation should also have been subject to appropriate quality control procedures before issue. As noted in the guidance for Regulation 4(6), where the requirements complied with under the 2017 Regulations or NIA satisfy equivalent requirements under REPPIR it will not be necessary to duplicate information. Instead the relevant documents may be cross referenced in the details of the assessment documentation.

Regulation 8 Detailed emergency planning zones

Regulation 8(1)	*(1) The local authority must determine the detailed emergency planning zone on the basis of the operator's recommendation made under (paragraph 2) of Schedule 4 and may extend that area in consideration of.*

	(a) local geographic, demographic and practical implementation issues; *(b) the need to avoid, where practicable, the bisection of local communities; and* *(c) the inclusion of vulnerable groups immediately adjacent to the area proposed by the operator.*
ACOP 8(1)	**190 The detailed emergency planning zone must be based on the minimum geographical extent proposed by the operator in the consequences report and should:** **(a) be of sufficient extent to enable an adequate response to a range of emergencies; and** **(b) reflect the benefits and detriments of protective action by considering an appropriate balance between;** **i. dose averted; and** **ii. the impact of implementing protective actions in a radiation emergency across too wide an area.** **191 In defining the boundary of a detailed emergency planning zone, geographic features should be used for ease of implementing the local authority's off-site emergency plan. Physical features such as roads, rivers, railways or footpaths should be considered as well as political or postcode boundaries, particularly where these features and concepts correspond with other local authority emergency planning arrangements.**
Guidance 8(1)	192 The definition of a detailed emergency planning zone is a defined zone around premises where it is proportionate to pre-define protective actions which would be implemented without delay (e.g. within a few hours) to mitigate the most likely consequences of a radiation emergency. The protective action taken should provide prompt protection to those who may be affected maximising effectiveness which would be reduced if time was taken to consider and implement appropriate action. 193 Protective actions do not need to be applied equally across the detailed emergency planning zone. It may be appropriate for some protective actions to be applied closer to the premises that are not necessary at greater distances. It should be considered that for maximum effectiveness protective actions may need to be implemented before a radiation emergency has occurred or when the details of the emergency are not fully understood. 194 The zone should be set as the minimum area the operator considers should be covered by the local authority's off-site plan in accordance with paragraph 2 of Schedule 4, as well as by the local authority applying local geographic, demographic and practical implementation factors and considering relevant protective action in the area. The emergency arrangements for the zone should be identified in the off-site plan as per Schedule 6, Part 2, Chapter 1. 195 The local authority should accept the operator's recommendation of the minimum geographical extent of the detailed emergency planning zone. The local authority should only change that area to extend it because of local geographic, demographic and practical implementation issues, the need to avoid bisecting communities or to include vulnerable groups at the outer limit of the area. The local authority is not required to have the expertise to verify the technical basis for the minimum extent set by the operator. 196 The zone will be determined by the local authority based on their knowledge of the local area and understanding of emergency planning in that area. The zone should be suitable and sufficient to meet the requirements of the regulations. The determination of the zone should consider properties which may fall beyond a natural boundary where it would be necessary to enter the detailed emergency planning zone to evacuate. Where a detailed emergency planning zone has a marine component, the most effective option to

	determine the boundary in this area would be to use a semi-circle of defined centre coordinate and radius. The boundary could also be determined using a rectangle with defined corner coordinates or a fixed integer distance from the coast bounded by two latitudinal coordinates. 197 An adequate response should meet the requirements in the Regulations to mitigate a radiation emergency and have the capability available to ensure this happens without unnecessary delay. Although, undertaking protective action can reduce the dose received, this needs to be balanced against the stress caused to affected people and the potential harm to them that could result from this action. The size of the detailed emergency planning zone and the protective action planned in it should not put people at risk of harm from unnecessary action. An excessively large area could also divert important resource from affected areas which require the most attention. If it is considered by the operator that the local authority has increased the detailed emergency planning zone excessively so that the increase is detrimental to the effectiveness of the off-site plan, this should be discussed with the local authority and the regulator. 198 Vulnerable groups include those that are less able to help themselves in the circumstances of an emergency and can include occupants of schools, hospitals, care homes, people with mobility difficulties, mental health issues, hearing and visual impaired etc. Those who cannot readily shelter (e.g. caravan and mobile home dwellers, campers, walkers, farmers, outdoor visitor attractions, etc.) are also considered to be vulnerable. 199 Other premises specific factors should be considered on a case-by-case basis. These might include developments being undertaken on or around the premises. Consideration should also be given as to whether or not the detailed emergency planning zone should include any adjacent or nearby premises working with ionising radiation to which these Regulations apply. 200 To determine the boundary of the detailed emergency planning zone, the local authority may adopt an approach as follows: (a) review the consequences report provided by the operator; (b) consider the most appropriate means of protection of the local population in relation to the types of radiation emergency identified by the operator; (c) produce proposed detailed emergency planning zone maps based on the consequences report, current planning arrangements and local geographic, demographic and practical implementation issues identified; and (d) liaise with relevant organisations to identify any issues or improvements to the detailed emergency planning area boundary/boundaries (for example emergency responders, experts in emergencies and responses, regulators, PHE, operator, adjacent local authorities). Existing local forums and liaison committees already set up to discuss emergency arrangements could be utilised for this purpose. If a section of the detailed emergency planning zone falls within the jurisdiction of another local authority or local authorities, the lead local authority will require cooperation with undertaking the determination from the relevant local authorities as per regulation 14. 201 Where information which may be sensitive (e.g. commercially or for security reasons) is provided to the local authority by the operator to inform the determination, appropriate security requirements with respect to handling of this information should be followed.
Regulation 8(2)	*(2) However, the local authority and operator may agree that, in relation to the premises, other arrangements are in place which sufficiently mitigate the consequences of the radiation emergency, and that no detailed emergency planning zone is necessary.*

Guidance 8(2)	202 Local authorities and operators who have duties under other legislation (such as COMAH) may have arrangements in place which satisfy the requirements of regulation 8(1). To justify that such arrangements are sufficient, they should make, retain, and update as appropriate, a record that clearly demonstrates that they have emergency plans which provide appropriate protection for all of the consequences reported under regulation 7. 203 If agreement cannot be reached that no detailed emergency planning zone is necessary, this should be discussed between the operator, local authority and the regulator.
Regulation 8(3)	*(3) The local authority must inform the operator and the regulator, within two months of having received the consequences report under regulation 7, of the determination made under paragraph (1).*
ACOP 8(3)	**204 The information provided to the operator and the regulator by the local authority of the determination of the detailed emergency planning zone should include:** **(a) a description of the area;** **(b) a map showing the extent of the area including any pockets of detailed planning within the outline planning zone as per Schedule 6, Part 2, Chapter 2, 3(b)(ii); and** **(c) suitable justification for the determination.**
Guidance 8(3)	205 The description of the area should identify the geographical features used to define the boundary and should include relevant grid references where appropriate. 206 The local authority should also inform other relevant parties of the determination as appropriate. This may include, for example, the Defence Nuclear Safety Regulator, Government departments, Welsh Government, Scottish Government, Nuclear Decommissioning Authority, Food Standards Agency, Food Standards Scotland, MCA, PHE, Harbour Master, the Agency and any others.
Regulation 8(4)	*(4) Where the local authority and the operator have agreed that no detailed emergency planning zone is necessary in accordance with paragraph (2), the local authority must inform the regulator as soon as reasonably practicable.*
Guidance 8(4)	207 The decision that there is no requirement for a detailed emergency planning zone should be reported to the regulator and suitable justification for the decision should be provided. 208 The regulator must be informed of this decision within two months of the local authority having been sent the consequences report under regulation 7.
Regulation 8(5) – 8(6)	*(5) On receipt of the local authority's confirmation of the detailed emergency planning zone, the operator must record the detailed emergency planning zone as finalised.* *(6) The local authority may re-determine the detailed emergency planning zone -* *(a) if there is a change in the local area which necessitates such a re-determination; or* *(b) if the local authority deems it appropriate as a consequence of the operator's consequences report made after an evaluation in accordance with regulation 6(1) or 6(2)(a).*

ACOP 8(5) - 8(6)	**209 In order to understand if a change in the local area necessitates a re-determination, the local authority should consider developments within or adjacent to the detailed emergency planning zone taking into account their potential impact on the effectiveness of the emergency plan.** **210 Re-determination of the detailed emergency planning zone should follow the approach set out under regulation 8(1)-8(5).**
Guidance 8(5) - 8(6)	211 A change in the local area which necessitates a re-determination may include: (a) a significant development within or adjacent to the local area which may impact on those factors in regulation 8(1) considered by the local authority when determining the detailed emergency planning zone ; (b) changes to the distribution of or addition of new vulnerable groups; (c) changes to the infrastructure facilitating an emergency plan (e.g. new roads); or (d) changes affecting the emergency responders facilitating an emergency plan (e.g. new or closed fire station, new or closed hospital, reduced services such as closing an A&E department). 212 It is not considered desirable for there to be frequent changes to detailed emergency planning zones because of the potential to cause confusion to members of the public living in the area. However, changes to the area which necessitate a re-determination may include significant temporary changes in the area which will be in place for an extended period of time (i.e. the development of a large construction village to support a significant infrastructure project). 213 Receipt of the consequences report from the operator made after an evaluation in accordance with regulation 6(1) or 6(2)(a) may also prompt a review of the detailed emergency planning zone.
Regulation 8(7)	*(7) If the local authority re-determines the detailed emergency planning zone in accordance with (paragraph 6), it must inform the operator and regulator as soon as reasonably practicable.*
Guidance 8(7)	214 Re-determination of the detailed emergency planning zone should follow the approach set out under Reg 8(1)-8(5) above and the supporting ACOP and guidance. 215 The local authority should inform the operator and regulator as soon as reasonably practicable when consideration is being given to re-determining the detailed emergency planning zone to ensure they are aware of any pending changes.

Regulation 9 Outline planning zone

Regulation 9(1)

(1) The outline planning zone must be determined as follows—

(a) in relation to a site for which the Office for Nuclear Regulation is the regulator, except for—

(i) an authorised defence site,

(ii) a nuclear warship site, or

(iii) a site which is a licensed site where that license has been granted either to the Secretary of State for Defence or to another person in relation to activities carried out by that person on behalf of the Secretary of State for Defence,

in accordance with Schedule 5.

(b) in relation to a site for which the Health and Safety Executive is the regulator, by the local authority following discussion with the operator;

(c) in relation to any other site, including the sites listed at sub-paragraph (a)(i) to (iii), by the Secretary of State.

Guidance 9(1)

216 Outline planning builds on the arrangements and capabilities in existing emergency plans to provide commensurate planning for low probability events. Where a site has a detailed emergency planning zone as per regulation 8(1), outline planning operates at distances beyond the detailed emergency planning zone but can also be undertaken in the detailed emergency planning zone (i.e. in the case that some protective actions may not be required in the detailed emergency planning zone except for severe emergencies). Where a site does not have a detailed emergency planning zone and an outline planning zone is required, outline planning operates from the site boundary.

217 The presence of an outline planning zone should assist the local authority in planning for extremely unlikely but more severe events. The central aim of the outline planning zone is to support the decision making of emergency responders in the event that detailed or generic arrangements are not sufficient. Outline planning is about identifying what protective actions may be needed at a strategic level, where those capabilities could be obtained from and the anticipated time frame over which they will become available, rather than having them in place ready to mobilise without delay.

218 There may be pockets of detailed planning within the outline planning zone as described in Schedule 6, Part 2, Chapter 2, 3(b)(ii).

219 There may be some cases where a detailed emergency planning zone is required but no outline planning zone is necessary. This could occur, for example, where the impact of a severe emergency is close to the site and the nature of the event means that it does not warrant emergency arrangements being in place at greater distances (e.g. an unplanned criticality event).

220 The operator's description of the geographical extent for the outline planning zone should be a circular radial distance (km) with the centre point clearly indicated. For premises with multiple facilities located around a site and potentially a number of centre points, the operator should describe one overall radial extent that encompasses all facilities.

221 The extent of the outline planning zone must be recorded in the off-site emergency plan under Schedule 6, Part 2, Chapter 3, paragraph 5.

Civil Nuclear Sites

222 In relation to a site falling within paragraph (1)(a) (i.e. civil nuclear sites), premises are categorised in Schedule 5. These premises have default distances from the site which should have outline planning as part of the local authority off-site emergency plan under regulation 11.

223 Categories have been set based on scientific modelling covering less likely and more severe events using the assessment approach set out in Schedule 3 and considering certain factors including:

(a) international comparisons for outline planning;
(b) the practical ability for a site and local authority to plan and respond effectively at greater distances; and
(c) the need for proportionate planning, given that these events are extremely unlikely.

224 If an operator of a site falling within paragraph (1)(a) believes that they should have an outline planning zone but there is no default planning distance specified in Schedule 5, the operator should consult the regulator as noted in Schedule 5.

225 The appropriate distance for outline planning taken from Schedule 5 must be set out by the operator in the consequences report under Schedule 4, Part 2, paragraph 2(a).

HSE regulated sites

226 In relation to a site falling within paragraph (1)(b), the requirement for an outline planning zone will be assessed by the local authority in conjunction with the operator. Where the premises presents a potential for an annual effective dose greater than 1 mSv to a member of the public following a radiation emergency, a discussion as to whether or not outline planning is required should take place between the local authority, the operator and any other responding organisations as appropriate. This discussion should be prompted by receipt of the consequences report by the local authority as required by regulation 7(3).

227 As the intent of outline planning is to build on existing emergency plans taking into account the consequences of the worst case radiation emergency identified by the operator, consideration should be given to the content and scope of existing emergency plans and whether existing arrangements and capabilities (e.g. for the 2017 Regulations, COMAH, Civil Contingencies Act (CCA)) are sufficient.

228 It may be possible to justify that no outline planning zone is required in accordance with Regulation 9(3). Consideration should be given as to how existing arrangements could be used or adapted for a radiation emergency. If more planning is required, the local authority should identify an appropriate outline planning distance based on the release scenario identified, existing planning arrangements and a proportionate response.

229 The discussions and conclusion should be recorded in such a way that allows for external verification.

Defence nuclear sites

230 For the determination of outline planning zones as per (1)(c) (i.e. defence nuclear sites), the extent of the outline planning zones will be determined by the Secretary of State for Defence.

231 Distances have been set based on the scientific modelling covering less likely and more severe events using the assessment approach set out in Schedule 3 and considering certain factors including:

(a) the practical ability for a site and local authority to plan and respond effectively at greater distances; and
(b) the need for proportionate planning, given that these events are extremely unlikely.

	232 The appropriate distance for outline planning will be provided to the operator by the MOD on behalf of the Secretary of State and must be set out by the operator in the consequences report under Schedule 4, Part 2(a). 233 If the results of the consequence assessment undertaken by the operator indicate that a different extent to the outline planning zone is required to that previously indicated, the Ministry of Defence will provide a revised extent. Any change to the extent of the outline planning zone will be notified to the local authority by the MOD via the operator on behalf of the Secretary of State.
Regulation 9(2)	*(2) The regulator and the Secretary of State may agree, in relation to a site falling within paragraph (1)(a), that the site has an outline planning zone which is greater or smaller than that determined in accordance with Schedule 5.*
Guidance 9(2)	**Civil Nuclear Sites** 234 This decision would be made by the regulator and the Secretary of State on receipt of a written justification of the proposed change to the outline planning zone specified in Schedule 5 from the operator. 235 Where an operator believes that a default distance should be varied, they should analyse the less likely, more severe emergencies for a site and their consequences. This assessment will need to be carried out in an equivalent manner to how they were arrived at by applying the standardised consequence assessment approach set out in Regulation 5 (and its supporting ACOP and guidance) to less likely, more severe events. 236 In consultation with the local authority, the operator will also need to consider all of the following: a) international comparisons for outline planning; b) the practical ability for a site and local authority to plan and respond effectively at greater distances; and c) the need for proportionate planning, given that these events are extremely unlikely. 237 Sites identified in paragraph (1)(a) may move between categories. This may occur for example if the site changes its activities in some way or is decommissioned and the risk is reduced. Such a change is a material change requiring compliance with regulation 6(1). It is not considered desirable for there to be frequent changes to outline planning zones because of the potential to cause confusion to members of the public living in the area. 238 Until agreement has been reached between the regulator and the Secretary of State about the appropriateness of a proposed outline planning zone distance that differs from the default distances in Schedule 5, the operator and local authority should comply with the default distance applicable to the site. 239 When default distances are used, planning arrangements do not need to extend beyond these distances and no justification of the outline planning zone distance is required by the operator.
Regulation 9(3)	*(3) The operator and the local authority may propose in relation to a site falling within paragraph (1)(b), that the site has no outline planning zone.*
ACOP 9(3)	**HSE regulated sites** **240 Where an outline planning zone is not considered necessary, the justification for the decision should be recorded by the operator in writing. This decision should reflect the results of the operator's hazard evaluation and consequence**

	assessment as required by regulations 4 and 5 and Schedule 3 and take into account whether existing arrangements and capabilities (e.g. for the 2017 Regulations, COMAH, CCA) are sufficient.
Regulation 9(4)	*(4) The planning to be undertaken by the local authority in relation to the outline planning zone must be commensurate to the risk of a radiation emergency affecting that area, and the local authority's off-site emergency plan required under regulation 11 must clearly set out when that plan would be brought into effect in relation to the outline planning zone.*
Guidance 9(4)	241 Planning in the outline planning zone should be proportionate to the consequences and likelihood of an event occurring. It should only include strategic arrangements and considerations that would be necessary as the tactical and operational arrangements will be developed on the day. These plans should build on the capability of plans that exist for either a radiation emergency or generic emergency planning arrangements that exist for other hazards. The local authority should use their emergency planning expertise and judgement on establishing the level of planning required. Outline emergency planning arrangements should be uniform across the outline planning zone. 242 Like detailed planning, outline planning should also reflect the benefits and the detriments of protective action by considering an appropriate balance between dose aversion and implementing protective action in a radiation emergency. 243 Where it is identified that outline planning is required, appropriate emergency planning arrangements should be identified in the local authority's off-site plan as required by regulation 11(1). Where existing arrangements are already in place covering part or all of the identified outline planning requirements and meeting the requirements of these Regulations, it is not necessary to repeat these arrangements in the local authority's off-site plan. Instead the off-site plan should act as a signpost to these. 244 If some of the outline planning zone falls in the jurisdiction of another local authority or local authorities, the lead local authority will require cooperation with the determination from the relevant local authorities as per regulation 14. 245 More details about the information that should be included in an off-site emergency plan are contained in regulation 11 (3) and Schedule 6. 246 The requirements specified in regulation 17 regarding the implementation of emergency plans apply to outline planning. 247 Where the assessed consequences of a potential radiation emergency warrants it, a range of distances up to the distance where a dose equivalent to the upper ERL could be averted may also be considered by the local authority. These would be considered for planning for urgent protective actions for premises located in populated areas or where a severe radiation emergency has a low likelihood of occurrence and is being assessed for outline planning purposes.

Regulation 10	Operator's emergency plan
Regulation 10(1)	*(1) Where the operator has made an evaluation in accordance with regulation 4(1) which shows that a radiation emergency might arise, the operator must make an adequate emergency plan designed to secure, so far as is reasonably practicable, the restriction of exposure to ionising radiation and the health and safety of persons who may be affected by radiation emergencies identified by the evaluation.*
ACOP 10(1)	**248 The operator should prepare the plan in accordance with the requirements of regulation 10 and the associated Schedules and should ensure the plan:** **(a) is a written document, or set of documents; and** **(b) can be put into effect without delay when required by:** **(i) providing the necessary information, instruction and training and making the necessary equipment available, in accordance with regulations 10(6)-10(8); and** **(ii) ensuring any other underpinning capabilities required to implement the plan are in place and readily available.**
Guidance 10(1)	249 The operator's emergency plan should be a written document, or set of documents, detailing how potential radiation emergencies identified by the hazard evaluation, or events which might lead to a radiation emergency, will be managed. This is applicable to all radiation emergencies, including events associated with a very low probability potentially not considered within the design, although the level of planning should be undertaken in a proportionate manner. The degree of planning should be proportionate to the consequences and likelihood of an event occurring. The operator's emergency plan does not distinguish between detailed and outline planning but, in the case of the very low probability events not considered within the design, the operator may have existing plans and strategies in place which can form part of the operator's emergency plan. 250 To protect persons 'who may be affected' by the radiation emergency the operator's emergency plan should include the necessary on-site action to respond to the emergency, including the action required to reduce or stop the effects of the radiation emergency. The operator's and off-site emergency plans should dovetail with one another, so co-operation is required between the operator and local authority (see regulation 13). 251 The operator's emergency plan covers all key operator action on-site and should refer to the action taken by off-site organisations in the provision of on-site support in the event of a radiation emergency. It should also include operator action for assisting with the emergency response off-site, for example arrangements for alerting off-site organisations and assisting with off-site monitoring. 252 The duty to prepare the operator's emergency plan for a premises is placed on that operator (although the operator of a berth or transit shed may need the assistance of the consignor in preparing the plan). 253 The process for making an adequate plan involves: (a) writing the plan, including the minimum content required by Schedule 6 and meeting the principles and purposes in Schedule 7; (b) implementing the necessary requirements to ensure the plan can be put into effect without delay when required (see ACOP paragraph 248); and (c) testing the plan to demonstrate its adequacy, making any necessary

	improvements to the plan as identified by the test. 254 Testing of the plan must be undertaken at least every 3 years in accordance with regulation 12; however it may be appropriate to test a new plan when it is first prepared to determine its adequacy. 255 The underpinning capabilities referred to in paragraph 248(b)(ii) are the resources and information necessary to develop and maintain an effective emergency response capability. The capabilities include but are not limited to: a) sufficient number of trained employees; b) facilities and equipment identified as being necessary to support the emergency arrangements. These should be continuously available and their readiness maintained. Suitable primary and back-up facilities may need to be designated, equipped and available for emergency use; c) suitable and sufficient, diverse and reliable communication channels available to support effective, resilient operation of the emergency arrangements; and d) adequate written emergency arrangements and procedures which are complete, up to date and readily available to all who need access. 256 Maintaining the adequacy of the plan is an on-going process involving review, revision and testing. For further guidance on this see regulation 12. 257 Operators who prepare emergency plans and contingency plans under other legislation, such as COMAH, the 2017 Regulations, NIA (nuclear site licence condition 11) or Dangerous Goods in Harbour Areas Regulations 2016 (DGHAR) [29] (for berth operators at ports) may choose to prepare an integrated operator's emergency plan covering a range of radiation and chemical or other hazards. An adequate operator's emergency plan could satisfy the requirements of more than one set of regulations. Where this approach is taken, the relevant regulator(s) may need to be informed, for example in the case of COMAH, the Competent Authority (which includes the Agency) should be informed. 258 Similarly, transit shed operators at airports will need to co-operate with airport operators' contingency plans drawn up under Civil Aviation Publication 168 (CAP 168) [30]. Operator's emergency plans prepared under REPPIR could help transit shed operators achieve this, if only partially. (Also see paragraph 417 under regulation 15 regarding co-operation relating to berth and transit shed operators). For the purposes of REPPIR the operator's emergency plan, whether or not it is an integrated plan as described above, should be made on the basis of the full range of radiation emergencies and satisfy all the relevant requirements in these Regulations. 259 An operator may need to consider the hazards and consequences, and the associated emergency arrangements, for any adjacent or nearby premises which could give rise to a radiation emergency and consider the benefit in joint planning or agreeing mutual support arrangements. Similarly, in the case of operators' emergency plans relating to multi-occupancy premises, such as industrial estates, berths or transit sheds, the benefits of joint planning between all relevant operators should be considered. 260 The operator should seek advice on radiation protection, as appropriate, at all relevant stages of the emergency planning process and must consult a Radiation Protection Adviser (RPA) in accordance with regulation 24.
Regulation 10(2)	*(2) When preparing an emergency plan, as required by paragraph (1), the operator must take into account—* *(a) the steps the operator has taken under regulation 4(4); and* *(b) the consequences assessed in accordance with regulation 5, including any variable factors which might affect the severity of the emergency.*

ACOP 10(2)	**261 The operator should consider variable factors, including where relevant:** **(a) the Schedule 3 requirements used in consequence assessments;** **(b) conditions in the affected facility, conditions affecting infrastructure or conditions affecting several facilities at once;** **(c) availability of employees with a role in the operator's emergency plan; and** **(d) multiple factors which could materialise in parallel.**
Guidance 10(2)	262 When preparing the emergency plan, operators must take into account any variable factors which may affect the consequences of a radiation emergency and consider the impact on planning assumptions. This ensures there is sufficient resilience in the emergency response capability. It ensures that the emergency plan is flexible enough to respond to a range of potential scenarios in order to restrict exposure to ionising radiation and to secure the health and safety of persons who may be affected by the radiation emergency so far as is reasonably practicable. 263 Variable factors which should be considered as a minimum are listed in ACOP paragraph 261. Variable factors in the consequences assessment relating to the operator's emergency plan are primarily source terms and weather variables. Conditions may include, for example: reduced access or visibility in the facility; loss of power or other services, including loss of off-site services/utilities; or loss of or damage to equipment. Such conditions could adversely affect the operator's ability to reduce or stop the release of radiation and could be caused by natural, human induced or other events, for example by extreme weather or earthquakes. The operator's emergency plan should consider the different levels and possible reductions in staffing levels at different times, for example at night, weekends and during holidays etc. or where the number of employees able to reach the premises is reduced due to the wider consequences of the event. This includes external support, for example the emergency services, who may be required to support the on-site response. Multiple factors occurring together should be considered so far as reasonably practicable, for example extreme weather could cause damage to equipment, facilities and services and could also limit the availability of emergency responders. 264 The operator's emergency plan should take reasonable account of the range of variability in the factors identified. The plan should take into account how variable factors could materialise and affect the ability of protective action to restrict exposure to ionising radiation and the health and safety of persons who may be affected by radiation emergencies and set out the action to address such changes. The operator's emergency plan should be capable of responding to the particular characteristics of an emergency as those characteristics emerge so arrangements should be in place to promptly anticipate and assess the characteristics (see Schedule 7 Part 1).
Regulation 10(3)	*(3) The operator's emergency plan must—* *(a) contain the information set out in Part 1 of Schedule 6; and* (b) *be drawn up in accordance with the principles and purposes set out in Schedule 7.*
Guidance 10(3)	265 For further guidance on the information to be included in the operator's emergency plan, see guidance to Schedules 6 and 7.
Regulation 10(4)	*(4) The operator must not require any person to carry out work with ionising radiation, and no person shall carry out such work unless—* *(a) the operator has complied with the requirements of paragraph (1); and* *(b) the local authority has complied with its duties in connection with the off-site emergency plan as set out in regulation 11, and has confirmed this to the operator in writing.*

Guidance 10(4)	266 The local authority is required to confirm in writing to the operator that it has prepared its plan as soon as reasonably practicable, in accordance with regulation 11(7).
Regulation 10(5)	*(5) The operator must, when preparing the emergency plan, or reviewing it under regulation 12(1), consult—* *(a) the operator's employees;* *(b) any persons carrying out work on behalf of the operator and who the operator considers might be affected by a radiation emergency;* *(c) the lead local authority;* *(d) the health authority in whose area the premises to which the emergency plan relates is situated;* *(e) Public Health England;* *(f) in addition to Public Health England, if the premises to which the emergency plan relates is in—* *(i) Wales, Public Health Wales, and* *(ii) Scotland, Health Protection Scotland;* *(g) the Category 1 responders in whose area in which the premises to which the emergency plan relates is situated; and* *(h) such other persons, bodies or authorities as the operator considers appropriate.*
Guidance 10(5)	267 The purpose of consultation is to engage with and take account of relevant parties' views during the preparation, review and revision of the operator's emergency plan, to maximise its effectiveness. 268 The operator will determine the appropriate means of consultation. Iterative consultation may be appropriate in developing the plan and the operator may consider using digital tools and open, collaborative approaches. Consulting in the earlier stages of development may be appropriate to allow consultees to influence the plan more effectively and efficiently. 269 Consultees should be given an appropriate amount of time to review and form meaningful views on the proposals. Consulting for too long will unnecessarily delay development of the plan but consulting too quickly will not give enough time for consideration and will reduce the quality of responses. Consultees should provide a response within an agreed timeframe (see ACOP paragraph 408). 270 The operator should consider the views provided and any evidence presented as part of the consultation process. 271 Responding organisations should be consulted to reach agreement on the role that they would perform in the event of a radiation emergency. See regulation 15 for further guidance on consultation and cooperation between employers. 272 Employees identified as having a role to play in the emergency response to a radiation emergency should be consulted. There are legal requirements to consult with employees under the Safety Representative and Safety Committees Regulations 1977 [31] and the Health and Safety (Consultation with Employees) Regulations 1996 [32]. Consultation should also include others who normally work on the premises, for example contractors'/tenants' employees. Consultation with employees and with contractors'/tenants' employees may be direct or through appointed employee representatives. 273 Consultation with the lead local authority should help to enable adequate dovetailing with the off-site emergency plan. See regulation 13 for further guidance on cooperation between the operator and local authority.

	274 The operator must consult the health authority for the area in the vicinity of their premises and inform them of the nature of the radioactive substances on the premises, so that the health authority can plan for the treatment of people who may be affected by a radiation emergency. Health authorities/boards are responsible for ensuring that satisfactory arrangements are in place for handling the health care aspects of the response to a radiation emergency. This will include ensuring arrangements are in place with NHS trusts, and/or hospital and emergency units responsible for managing primary and community care for the treatment of any casualties that may arise and determining, where appropriate, the most suitable storage locations for supplies of relevant stocks of health care products. 275 The operator should consult PHE, Public Health Wales or Health Protection Scotland, as appropriate, on matters affecting the public health response. PHE's Centre for Radiation, Chemical and Environmental Hazards (PHE CRCE) provides radiation protection functions in Scotland, England and Wales and the operator should consult it on public health matters relating to radiation protection. 276 Category 1 responders identified as having a role to play in the emergency response on the premises must be consulted and this should include consulting on the radiation protection arrangements for emergency services employees responding to such an emergency (see regulation 18 on emergency exposures and regulation 24 on consulting a radiation protection adviser). 277 It may also be necessary to consult with other individuals or organisations who may be involved with or affected by the implementation of the operator's emergency plan (e.g. Category 2 responders). Berth or transit shed operators should consult with harbour authorities or airport operators on the operator's emergency plan. Further guidance on consultation and co-operation can be found under regulations 13 and 15.
Regulation 10(6)-10(8)	*(6) The operator must ensure that any employee on site is or has been provided with such suitable and sufficient information, instruction and training as they require in relation to a radiation emergency.* *(7) The operator must ensure that any emergency worker who may be involved with or may be affected by arrangements in the operator's emergency plan is or has been provided with—* *(a) suitable and sufficient information, instruction and training;* *(b) any equipment necessary to perform the functions allocated to them by the operator's emergency plan; and* *(c) any equipment necessary to restrict their exposure to ionising radiation including, where appropriate, the issue of suitable dosemeters or other devices.* *(8) In the case of a person who is not employed by the operator, the information, instruction, training and equipment required by regulation (7) relates only to specialised equipment to be used on the operator's premises in accordance with the operator's emergency plan, and which is information, instruction, training or equipment the operator does not expect the person to have received or have available already.*
Guidance 10(6)-10(8)	278 Regulations 10(6) to10(8) place responsibilities on the operator for provision of information, instruction, training and equipment and apply whether or not emergency exposures are likely (see guidance on regulations 18(1) (b) and (c) regarding training and equipment for employees who may be subject to emergency exposures). The provision of these requirements should be proportionate to the extent that the employee is affected by the operator's emergency plan, for example those with a defined role in the plan will require a greater level of information, instruction and training than other employees on the premises.

Information, instruction and training for employees

279 The operator should ensure that all employees working on their premises, including those of other employers, are given suitable and sufficient information, instruction and/or training on what to do in the event of a radiation emergency. Operators may require that employers that are located on their premises provide this information, instruction and/or training to their own employees (which, if required, would be a duty under regulation 15(3)). The operator will also need to provide suitable and sufficient information and instruction, and where necessary training, to visitors who are on the premises. This may include patients attending or visiting hospitals, and students attending educational or research establishments.

Information, instruction and training for emergency workers

280 The information, instruction and training provided to persons with a role in the operator's emergency plan should allow them to perform their role effectively in the event of a radiation emergency. It will also enable their exposure to ionising radiation to be restricted, so far as is reasonably practicable.

281 The requirements of regulation 10(7) apply to all emergency workers who may be involved with or may be affected by arrangements in the operator's emergency plan, including those from off-site responding organisations. For emergency workers not employed by the operator, this should only cover information, instruction and training which is not expected to be provided by their own employer but is required to enable them to perform their role in the plan effectively in the event of a radiation emergency and to facilitate joint working with the operator. This should cover, for example:

(a) general information about the premises and the nature of the potential hazards;
(b) specific information, instruction and/or training on the role of emergency workers from responding organisations in the plan;
(c) arrangements to respond to a radiation emergency within the premises and how emergency workers from off-site organisations would interface with these arrangements; and
(d) what equipment is available at the premises for emergency workers from responding organisations to use, including details of where it is located and how it is used (training may also be required for this purpose).

282 The information, instruction and training should also include radiation protection arrangements. This will allow responding organisations to consider how they will interface with these arrangements on the premises to enable their exposure to ionising radiation to be restricted so far as is reasonably practicable.

General requirements for information, instruction and training

283 The operator should ensure that information, instruction and training is kept up to date and reviewed regularly to ensure it remains current. It should also be repeated at an appropriate frequency to maintain competence levels. Training records should be kept to identify when refresher training is needed. The operator should have arrangements in place to ensure that all individuals new to the premises are given suitable and sufficient information, instruction and training when they begin working on the premises. If there are any changes to the emergency arrangements, for example the introduction of new equipment, the relevant emergency responders should be provided with further information and training.

284 Information, instruction and training should be effective and the operator should check its adequacy. This could include requesting feedback from emergency workers and employees and reviewing capabilities, for example during the testing of emergency plans. The operator should ensure the training delivers its aims and objectives and, if not, make changes to the programme.

	Equipment 285 The operator should have arrangements for any equipment that has been identified in the operator's emergency plan to be available for all its employees who require use of such equipment in the event of a radiation emergency. In the case of emergency workers not employed by the operator, for example emergency services assisting at the premises, the equipment provided by the operator should only be specialist equipment which the emergency worker is not expected to have access to as part of their routine role. 286 Equipment should be maintained, ready for use and kept in an accessible location. The operator should provide suitable information, instruction and/or training on the use of such equipment. 287 Personal protective equipment may be necessary to restrict emergency workers' exposure to ionising radiation and they should also be issued with suitable dosemeters, where appropriate. Some emergency workers may already be provided with routine dosimetry under the 2017 Regulations, and the operator should consider whether to make arrangements to include additional dosemeters in the event of a radiation emergency occurring (assuming that there is enough time to do this). Further guidance on dose assessments for employees who may receive emergency exposures can be found under regulation 18(1)(e).
Regulation 10(9)	*(9) An operator which has prepared an emergency plan in accordance with this regulation must—* *(a) review that plan as a consequence of any review required by regulation 6; and* *(b) update the plan, if necessary, as a consequence of a review undertaken in accordance with sub-paragraph (a).*
Guidance 10(9)	288 Where the operator has made an assessment under regulation 6 to take account of a material change in the work with ionising radiation, a review of the plan will be required to identify any changes required as a result of the new assessment. Where changes are made the plan should be updated as soon as reasonably practicable, following consultation on the plan where relevant. 289 Information, instruction and training should also be reviewed and where necessary revised and any additional equipment should be provided. 290 Further guidance on reviewing emergency plans is available under regulation 12.
Regulation 10(10)	*(10) The operator must retain the emergency plan on the premises to which it relates, and must provide details of that plan to the local authority and the regulator upon request and within such reasonable time as the local authority or the regulator may request.*
Guidance 10(10)	291 The operator should ensure that an up to date copy of the operator's emergency plan is appropriately located at the premises and that it is readily available and accessible at all times to those with a role in the plan. It may be appropriate to hold multiple controlled copies at the premises in addition to a copy at a location off-site in the event that the copies on the premises are destroyed or become inaccessible during a radiation emergency. 292 The regulator may request a copy of the operator's emergency plan or parts of the plan. There is no need to routinely send a copy of the operator's emergency plan to the regulator without being asked to do so.

Regulation 11 Local Authority's emergency plan

Regulation 11(1)-11(2)	*(1) Where premises require a planning zone under either or both of regulations 8 or 9, the local authority must make an adequate off-site emergency plan covering that zone or zones.* *(2) The plan required by paragraph (1) must be designed to mitigate, so far as is reasonably practicable, the consequences of a radiation emergency outside the operator's premises.*
ACOP 11(1)	**293 The local authority should prepare the plan in accordance with the requirements of regulation 11 and the associated Schedules and should ensure the plan:** **(a) is a written document, or set of documents; and** **(b) can be put into effect without delay when required by ensuring that prior information has been supplied in accordance with regulation 21 and by seeking confirmation, so far as reasonably practicable, from responding organisations that:** **(i) the necessary information, instruction and training has been provided and the necessary equipment for restricting exposure has been made available, in accordance with regulation 11(6); and** **(ii) any other underpinning capabilities required to implement the plan are in place and readily available.**
Guidance 11(1)-11(2)	294 The off-site emergency plan, so far as it covers any detailed emergency planning zone, should set out detailed planning arrangements to provide prompt protection of members of the public in this area. The degree of planning should be proportionate to the consequences and likelihood of an event occurring. Planning for the outline planning zone should only include strategic arrangements and considerations and may refer out to generic emergency planning arrangements, where appropriate. 295 A local authority should prepare a written off-site emergency plan for any premises in their area with a detailed emergency planning zone and/or an outline planning zone as determined under regulations 8 and 9 respectively. One off-site emergency plan should be prepared covering both the detailed emergency planning zone and the outline planning zone as appropriate. The local authority with responsibility for preparing the off-site emergency plan is the lead local authority. 296 The off-site emergency plan should cover all responding organisations' activities, both those off-site and those helping with mitigatory action on the premises. The local authority and the operator should co-operate to ensure that the plans dovetail with one another (see regulation 13). 297 The process for making an adequate plan involves: (a) writing the plan, including the minimum content required by Schedule 6 and meeting the principles and purposes in Schedule 7; (b) implementing the necessary requirements (or seeking confirmation of this) to ensure the plan is capable of being put into effect without delay when required; and (c) testing the plan to demonstrate its adequacy and making any necessary improvements to the plan as identified by the test. 298 Testing of the plan must be undertaken at least every 3 years in accordance with regulation 12; however it may be appropriate to test a new plan when it is first prepared to

	determine its adequacy. 299 The local authority should seek confirmation, to the extent possible, from other responding organisations that the underpinning capabilities required to implement the plan are in place and readily available for example by asking for written confirmation of this when consulting on and reviewing the plan. The underpinning capabilities are those referred to in paragraph 293(b) and other capabilities could include, for example, the organisation's own supporting plans and procedures. Paragraph 255 provides further guidance on the underpinning capabilities required to implement the plan. Regulation 15(3) requires employers of employees with a role in the plan to co-operate with the local authority. 300 Maintaining the adequacy of the plan is an on-going process involving review, revision and testing. For further guidance on this see regulation 12. 301 When preparing the off-site emergency plan, the local authority should plan to mitigate the consequences of radiation emergencies based on the information provided in the consequences report and should take into account any other relevant information provided by the operator, for example through: (a) any meeting held with the local authority to discuss the consequences report (regulation 7(4)); and (b) any reasonable request for information made by the local authority (regulation 7(5)). 302 The lead local authority may request the co-operation of another local authority in preparing the off-site emergency plan (see regulation 14) and any employer of any person whose participation is reasonably required by the off-site emergency plan also has duties to co-operate with the lead local authority (see regulation 15). 303 Local authorities who prepare emergency plans for the premises under other legislation, such as COMAH, may choose to prepare an integrated off-site emergency plan covering a range of radiation and chemical or other hazards. An effective off-site emergency plan could satisfy the requirements of more than one set of regulations. Where this approach is taken, the relevant regulator(s) may need to be informed, for example in the case of COMAH, the Competent Authority (which includes the Agency) should be informed. 304 The local authority may also need to consider the hazards and consequences, and the associated emergency arrangements, for any adjacent or nearby premises which could give rise to a radiation emergency and consider the benefit of the off-site emergency plan covering more than one premises. In the case of off-site emergency plans relating to multi-occupancy premises, such as berths or transit sheds, the plan would need to take into account all relevant operators on the premises. 305 Off-site emergency plans prepared for nuclear powered vessels that form separate premises would cover the areas surrounding the relevant berths or fixed point moorings. This includes areas of estuaries, rivers or sea lochs in the vicinity of berths or moorings. Where such berths or fixed point moorings are within a nuclear licensed site or MOD controlled premises, then nuclear powered vessels are considered as part of that site or premises (see paragraph 22 under the definition of 'premises' in regulation 2).
Regulation 11(3)	*(3) The off-site emergency plan must—* *(a) contain the information set out in Chapter 1 of Part 2 of Schedule 6 about the detailed emergency planning zone (where there is a detailed emergency planning zone);* *(b) contain the information set out at Chapter 2 of Part 2 of Schedule 6 about the outline planning zone (where there is an outline planning zone);*

	(c) comply with Chapter 3 of Part 2 of Schedule 6; and *(d) be drawn up in accordance with the principles and purposes set out in Schedule 7.*
Guidance 11(3)	306 For further guidance on the information to be included in the off-site emergency plan, see guidance to Schedules 6 and 7.
Regulation 11(4)	*(4) The off-site emergency plan must be prepared within 8 months of the local authority's receipt of the consequences report and in any event before the operator commences work with ionising radiation to which the evaluation made in accordance with regulation 4(1), 6(1) or 6(2) applies.*
Guidance 11(4)	307 Where there is a requirement for a detailed emergency planning zone, the 8 month timeframe in this regulation includes 2 months for the determination in accordance with regulation 8(3). 308 The local authority must prepare and put into effect the off-site emergency plan and confirm its completion in writing to the operator and the regulator, in accordance with regulation 11(7), before the operator can start working with ionising radiation (see regulation 10(4)(b)).
Regulation 11(5)	*(5) In preparing an off-site emergency plan, pursuant to paragraph (1) or in reviewing such a plan pursuant to regulation 12(1), the local authority must consult—* *(a) the operator of the premises to which the plan relates;* *(b) Category 1 responders in whose area in which the premises to which the emergency plan relates is situated;* *(c) Category 2 responders (where appropriate) in whose area in which the premises to which the emergency plan relates is situated;* *(d) each health authority in the vicinity of the premises to which the plan relates (if that health authority is not a Category 1 responder);* *(e) the Agency;* *(f) Public Health England;* *(g) in addition to Public Health England, if the premises to which the emergency plan relates is in—* *(i) Wales, Public Health Wales, and* *(ii) Scotland, Health Protection Scotland; and* *(h) such other persons, bodies or authorities as the local authority considers appropriate.*
ACOP 11(5)(f)	**309 The local authority should consult PHE's Centre for Radiation, Chemical and Environmental Hazards to confirm its understanding of the following matters, where relevant:** **(a) the planning of urgent protective action as part of the off-site protective action required by Schedule 6, 2(f);** **(b) the application of reference levels required by regulation 20; and** **(c) PHE's role in the off-site emergency plan.**
Guidance 11(5)	310 The purpose of consultation is to engage with and take account of relevant parties' views during the preparation, review and revision of the off-site emergency plan, to

	maximise its effectiveness. Consultation should ensure that wider specialist knowledge, responsibilities and national guidance (e.g. the National Nuclear Emergency Planning and Response Guidance (NNEPRG)) [2] are taken into account in developing and resourcing the off-site emergency plan. 311 The local authority will determine the appropriate means of consultation. However, the local authority must ensure that all individuals or organisations identified in regulation 11(5) and anyone else with a role in delivering the off-site emergency plan are made aware of the proposals and its contents. Iterative consultation may be appropriate in developing the plan and the local authority may consider using digital tools and open, collaborative approaches. For example, online information sharing platforms could be used to facilitate multi-organisation collaboration. Consultation should utilise a single forum or partnership set up to enable co-operation between the local authority and employers with duties under the off-site emergency plan (see paragraph 414). The local authority may also need to tailor the consultation to the needs and preferences of particular groups, such as the groups listed in paragraph 321. 312 Consultees should be given an appropriate amount of time to review and form meaningful views on the proposals. Consulting for too long will unnecessarily delay development of the plan but consulting too quickly will not give enough time for consideration and will reduce the quality of responses. The local authority will need to consider consultation time in its planning to comply with the timescales in these Regulations. Consultees should provide a response in an agreed timeframe (see ACOP paragraph 408). 313 The local authority should consider the views provided and any evidence presented as part of the consultation process. 314 Responding organisations should be consulted and should reach agreement on the role that they would perform in the event of a radiation emergency. See regulation 15 for further guidance on consultation and cooperation between employers. 315 Consultation with the operator should ensure adequate dovetailing with the operator's emergency plan. See regulation 13 for further guidance on cooperation between the operator and local authority. 316 Consultation with Category 1[16] responders and appropriate Category 2 responders should ensure the plan enables a combined response from all emergency responders, leading to integrated arrangements for emergency management. Discussions with the emergency services should include radiation protection arrangements for persons responding to a radiation emergency (see regulation 18 on emergency exposures). 317 Health authorities/boards are responsible for ensuring that satisfactory arrangements are in place for handling the health care aspects of the response to a radiation emergency. It is important for them to be aware of potential radiation emergencies so that they can dovetail their own emergency arrangements with those of the emergency services and the local authority. The health authorities may themselves also consult (or facilitate consultation with) the appropriate NHS trusts and/or hospital and emergency units. Hospitals, accident and emergency departments and other trusts responsible for managing primary and community care within the vicinity of the premises need, wherever possible, to be aware in advance of the possibility of dealing with and treating large numbers of people or casualties requiring special treatment. 318 The local authority must consult the relevant Agency, in particular regarding any protective action to mitigate serious consequences to the environment (see paragraph 37) and the arrangements for the transition to an existing exposure situation. For example how radioactive waste management arrangements and remedial measures for the environment would be established. The arrangements for the transition to an existing

[16] As defined in the Civil Contingencies Act

	exposure situation may have an impact on planning for the response phase of the emergency. It may be appropriate at this stage to discuss the requirements of other environmental legislation with the relevant Agency. 319 The local authority should consult PHE, Public Health Wales or Health Protection Scotland, as appropriate, on matters affecting the overall public health response. Additionally, PHE CRCE provides radiation protection functions in Scotland, England and Wales and the local authority should consult it on public health matters relating to radiation protection. 320 Consultees should consider what assistance they might need from neighbouring authorities, for example local authorities, emergency services or health authorities/boards, especially in relation to outline planning which will cover a greater distance. The lead local authority can request the co-operation of another local authority in accordance with regulation 14 in order to make its off-site plan (further guidance is available under regulation 14). 321 It may be necessary to consult with other individuals or organisations who may be involved with or affected by the implementation of the off-site emergency plan (e.g. regulators, certain government departments who provide national response capabilities, water authorities/suppliers, voluntary organisations, vulnerable groups and relevant local employers). 322 Local authorities should consult harbour authorities and airport operators, as appropriate, when preparing off-site emergency plans for berth or transit shed operators as there may be an overlap between the off-site emergency planning zones and the areas covered by emergency plans prepared by harbour authorities or airport operators.
Regulation 11(6)	*(6) The employer of any emergency worker who may be required to participate in the implementation of the off-site emergency plan must ensure that each such emergency worker is provided with—* *(a) suitable and sufficient information, instruction and training; and* *(b) any equipment necessary to restrict that employee's exposure to ionising radiation including, where appropriate, the issue of suitable dosemeters or other devices.*
Guidance 11(6)	323 The purpose of this regulation is a general requirement for information, instruction and training and equipment to restrict exposure and applies whether or not emergency exposures are required (see guidance on regulations 18(1)(b) and (c) regarding training and equipment for employees who may be subject to emergency exposures). 324 The information, instruction, training and equipment provided to emergency workers should allow them to perform their role in the off-site emergency plan effectively in the event of a radiation emergency, and enable their exposure to ionising radiation to be restricted, so far as is reasonably practicable. The level of information, instruction, training and equipment provided should be proportionate to the particular role of the emergency worker. 325 The employer should ensure that information, instruction and training is kept up to date and reviewed regularly to ensure it remains current. It should also be repeated at an appropriate frequency to maintain competence levels. Training records should be kept to identify when refresher training is needed. The employer should have arrangements in place to ensure that all individuals new to the role are given suitable and sufficient information, instruction and training. If there are any changes to the emergency arrangements, for example the introduction of new equipment, emergency workers will

	require further information, instruction and/or training. 326 Information, instruction and training should be effective and the employer should check its adequacy. This could include requesting feedback from emergency workers and reviewing capabilities, for example during the testing of emergency plans. The employer should ensure the training delivers its aims and objectives and, if it not, make changes to the programme. 327 Personal protective equipment may be necessary to restrict emergency workers' exposure to ionising radiation and they should also be issued with suitable dosemeters, where appropriate. Further guidance can be found under regulation 18(1)(e) in relation to dose assessments for employees who may receive emergency exposures. 328 The operator may, where appropriate, provide advice and assistance to employers regarding information, instruction, training and equipment needs for emergency workers, including advice on radiation protection.
Regulation 11(7)-11(8)	*(7) The local authority must confirm in writing to the operator and to the regulator that it has prepared an off-site emergency plan as soon as reasonably practicable after the preparation of such a plan.* *(8) The local authority must provide a copy of the off-site emergency plan, or parts of it, to the regulator upon request and within such reasonable time as the regulator may specify.*
Guidance 11(8)	329 The regulator may request a copy of the off-site emergency plan or parts of the plan. There is no need to routinely send a copy of the off-site emergency plan to the regulator without being asked to do so. 330 The local authority should ensure that an up to date copy of the off-site emergency plan is provided to those persons with a role in the plan.

Regulation 12	**Reviewing and testing of emergency plans**
Regulation 12(1)	*(1) Each operator or local authority who has prepared an emergency plan pursuant to regulation 10 or 11, as the case may be, must, at suitable intervals not exceeding 3 years unless otherwise agreed by the regulator—* *(a) review and where necessary revise the plan for which they are responsible; and* *(b) test that plan, taking reasonable steps to arrange for all those with a role in the plan to participate in the test to the extent necessary to ensure that the plan is effective.*
ACOP 12(1)	**331 The result of a review of an emergency plan should be recorded, including actions to address any recommendations. Where the review requires changes to the emergency plan these should be managed through the use of an auditable system which tracks and logs the changes from inception to completion of implementation.**
Regulation 12(2)-12(7)	*(2) The test required by paragraph (1)(b) need not extend to testing a local authority's emergency plan so far as it extends to the outline planning zone, unless—* *(a) a test is necessary in order to review or revise the plan, as required under paragraph (1)(a); or*

	(b) the regulator requires a test. *(3) The regulator may only agree that the review and test required under paragraph (1) may take place after the expiry of a three year period if—* *(a) the operator or local authority, as the case may be, has sent a written request for such an extension of time to the regulator; and* *(b) the written request is sufficient to demonstrate that the circumstances of the request are reasonable and exceptional.* *(4) A review required under paragraph (1) must take into account—* *(a) changes occurring in the work with ionising radiation to which the plan relates;* *(b) changes within the emergency services concerned;* *(c) new knowledge or guidance, whether technical or otherwise, concerning the response to radiation emergencies;* *(d) any material change to the assessment on which the plan was based since it was last reviewed or revised;* *(e) any relevant information derived from an assessment of or a report about the effectiveness of an emergency plan required by regulation 17(6); and* *(f) any relevant information derived from a report into the outcome of an earlier test as required by paragraph (8).* *(5) In determining how the off-site emergency plan is to be tested, the local authority must cooperate with—* *(a) the operator; and* *(b) any Category 1 responders in whose area the premises to which the emergency plan relates is situated.* *(6) A review or test of the plan required by this regulation must take into account any lessons learned from—* *(a) past emergency exposure situations, whether at the operator's premises or not; and* *(b) the United Kingdom's participation in emergency exercises at national and international level.* *(7) The test of the plan, required by paragraph (1)(b) must be adequate to test the ability to implement the plan in question, but the operator or the local authority, as the case may be, may for the purpose of determining the extent of that test, bear in mind—* *(a) the length of time since the last test of the plan;* *(b) the extent of the testing undertaken on the last occasion;* *(c) any activation of the plan as a response to a radiation emergency since the last test; and* *(d) any revisions of the plan made by the review required under paragraph (1)(a).*
ACOP **12(1, 2, 5, 6 & 7)**	**332 An adequate test of the operator's emergency plan or detailed planning in the off-site emergency plan should demonstrate:** **(a) that the plan meets the principles and purposes of an emergency plan set out in Schedule 7;** **(b) that the plan meets the requirements of regulations 10 or 11 (as appropriate), and the appropriate paragraphs of Schedule 6;**

	(c) that the plan can be practicably implemented and will be effective in the response to a radiation emergency to secure, so far as reasonably practicable, the restriction of exposure to ionising radiation and the health and safety of workers and members of the public; **(d) the completeness, consistency and accuracy of the emergency plan and other documentation used by responding organisations;** **(e) the adequacy of the equipment and facilities and their operability;** **(f) the competence of emergency responders to carry out the duties identified for them in the emergency plan; and** **(g) whether any reasonable improvements can be made to the plan.** **333 An adequate test of outline planning in the off-site emergency plan should demonstrate:** **(a) that the plan meets the principles and purposes of an emergency plan set out in Schedule 7;** **(b) that the plan meets the requirements for outline planning in regulation 11 and the appropriate paragraphs of Schedule 6;** **(c) that the plan provides a credible basis for a response to a radiation emergency in the outline planning zone by demonstrating that high level actions have been identified, including where capabilities could be obtained from and how (this may be through expansion of arrangements in the detailed emergency planning zone where one exists);** **(d) the completeness, consistency and accuracy of the emergency plan and other documentation used by responding organisations;** **(e) the competence of emergency responders to carry out the duties identified for them in the emergency plan; and** **(f) whether any reasonably improvements can be made to the plan.**
Guidance 12(1)–12(7)	**Reviewing and Revision** 334 Review and, where necessary, revision of emergency plans must be undertaken at least once every three years. Except where the regulator agrees to an extension in exceptional circumstances (see paragraph 342). 335 There are considerable benefits to be gained from issuing the operator's emergency plan and the off-site emergency plan at a similar time so that the review and revision of the plans are aligned. 336 Review and revision in accordance with this regulation are different from updating emergency plans. Updating plans is an on-going process which is carried out to reflect any changes in the practical details of the emergency response arrangements. For example changes in the responding organisations' telephone numbers, employees' names or the mitigation equipment to be mobilised. 337 Reviewing is a fundamental process, examining the adequacy and effectiveness of the components of the emergency plan and how they function together. Reviewing the plan should ensure that the requirements of regulation 10 or 11 (as appropriate) and the appropriate parts of Schedule 6 are still met and that the plan still aligns with the principles and purposes in Schedule 7. The review process should take into account: (a) any changes identified in the review of the hazard evaluation and consequence assessment (regulation 6) and any changes to the consequences report (regulation 7); (b) any changes to the boundary of the detailed emergency planning zone or

Guidance 12(1)–12(7)	outline planning zone; (c) any changes in the detailed emergency planning zone or outline planning zone, for example a new school or hospital; (d) any changes in the responding organisations relevant to the operation of emergency plans; (e) advances in technical knowledge, for example new, more effective means of mitigation; (f) new accepted international and national good practice including standards and guidance concerning the response to emergencies; (g) significant changes in staffing resources including contractors; (h) knowledge gained as a result of real emergencies occurring, either at the premises (see regulation 17(6)) or elsewhere, including international emergencies; (i) lessons learned during the testing of emergency plans at both national and international level; and (j) any other changes which could affect the effectiveness of the plan. 338 One of the principal contributions to the process of reviewing and revising emergency plans will come from the results of tests of the emergency plans. A report on the outcome of the test is required by regulation 12(8) (see regulation 12(8)-12(10) for further ACOP and guidance). 339 Persons or employers, who have a responsibility under the plan should be provided with the opportunity to contribute to the review and where necessary take part in the revision of the plan. 340 For this to take place effectively there has to be communication between the operator, local authority and responding organisations. Collaborative working is often successful through the use of a single forum or partnership (see paragraph 414). There is a requirement to consult on the review with statutory consultees and others as appropriate (see regulations 10(5) and 11(5)). Changes which improve the operational effectiveness of the emergency plan should be incorporated as soon as reasonably practicable and consulted on with statutory consultees and other identified individuals and organisations. Any changes to the roles in the plan should be agreed with those affected. The revised plan should then be reissued to all plan holders and updates which affect the emergency response should be communicated appropriately. The operator or local authority should ensure the underpinning capabilities required to implement the revised plan are in place and readily available so that the plan can be put into effect without delay when required (see ACOP paragraphs 248 and 293). 341 If any significant changes are being made (such as significant changes in radionuclides used, plant modifications, or organisational structure) a review of the adequacy and accuracy of the emergency planning arrangements should be done at the same time. Under these circumstances, operators and local authorities should not wait until the three-year review is due to review their emergency plans (see regulation 10(9) which requires the operator to review and where necessary update the plan as a consequence of a review of the hazard evaluation and consequence assessment to take account of material changes in the operator's work with ionising radiation). 342 If exceptional circumstances prevent the review of an emergency plan being completed within a three year period, the operator or the local authority as the case may be, may submit a written request to the regulator for an extension. The request should explain what the exceptional circumstances are and the regulator may agree to a longer period of time if it is satisfied that the circumstances of the request are exceptional, and that an extension would be proportionate and would not adversely affect safety. The regulator would notify any such extension in writing. For example, if a significant material change is taking place at the end of, or immediately after, the three year review period which will require a review of the emergency plan, this may be considered

Guidance 12(1)–12(7)	exceptional circumstances. In such circumstances, the regulator may agree to an extension where it is proportionate to do so and providing the review is expected to take place within a reasonable time, usually within 6 months of the date it was due. Exceptional circumstances may also include circumstances where resource is diverted to respond to a real emergency (radiological or otherwise) but do not usually include extending the three year period to meet operational and business needs. **Testing emergency plans** 343 The purpose of testing emergency plans is to demonstrate their ability to deliver an effective response to a radiation emergency which fulfils the purposes set out in Schedule 7. It should give confidence in the accuracy, completeness, practicability and adequacy of the plans and should identify how plans can be improved. 344 There are considerable benefits to be gained from testing the operator's and local authority's off-site emergency plans (or parts of plans) at the same time. These benefits include ensuring that both emergency plans are compatible with one another and potential financial savings by avoiding duplicate testing. 345 Testing should examine the adequacy of communication arrangements in the plan to manage communication challenges associated with a radiation emergency, including radiation emergencies based on perceived risk. See paragraph 367 for further guidance on testing communications. 346 For those operators working in the nuclear industry, on-site tests undertaken in accordance with nuclear site licence conditions should usually satisfy the equivalent requirements of REPPIR for testing the operator's emergency plan. 347 Operators of premises with a number of radiation sources in different installations with the potential to cause a radiation emergency should consider testing the emergency arrangements for each such installation at least once during the three-year testing period. On some premises there will be scope for economies of scale, using lessons learned from live tests on some installations, supported by appropriate table-top tests for other installations. This will depend on similarities in the hazards and risks posed, and on the type of emergency response. It is important that the lessons identified from such tests are reported to all relevant employees on the premises. Conclusions about the installations under examination should be drawn from the findings of the test. 348 Berth or transit shed operators may decide to test aspects of their emergency plans at the same time as local authorities test the off-site emergency plans, or harbour authorities or airport operators test their own emergency arrangements under other legislation (e.g. DGHAR). There would be benefits to all parties in this, as the way in which the various plans dovetail could be assessed. 349 Dealing with the consequences of radiation emergencies at the premises may require the assistance of the emergency services. Therefore, it may be appropriate for them to attend many of the operator's tests, but not necessarily all. 350 Testing of off-site emergency plans could include a range of activities such as communication exercises to examine the adequacy of the communication arrangements between all the key emergency responders during a radiation emergency and table-top exercises to examine command and control arrangements and inter-agency liaison during an emergency. There will be considerable benefit in carrying out some of these activities more frequently. 351 In some local authority areas, there may be scope for economies of scale in the testing regime. It may be possible for one active participation test or table-top test to test the off-site emergency plan(s) for two or more premises (e.g. adjacent premises or those within the same local forum where the emergency responders are the same). This will depend on the similarities of their location and of the hazards and risks posed to the nearby population. However, the test should use scenarios appropriate for each premises

Guidance 12(1)–12(7)	that fully test the off-site plan(s). Where the operators test their plans at the same time, each operator would have to test the premises-specific features in some other way, for example as part of the operator's emergency plan test or a communications test. 352 Local authorities may decide to test their off-site emergency arrangements for facilities under other regulations at the same time as their off-site emergency plans under REPPIR. There would be benefits to all parties in this, as the way in which the various plans dovetail could be assessed. **Adequate testing of the operator's emergency plan and detailed planning in the off-site emergency plan** 353 Where the guidance below refers to detailed emergency planning zones, it also applies to any pockets of detailed planning within the outline planning zone. 354 Plans for the detailed emergency planning zone and operator's emergency plan should be tested through practical rehearsal of strategic, tactical and operational decision making and implementation. Testing must be undertaken at least once every three years, except where the regulator agrees to an extension in exceptional circumstances (see paragraph 369). 355 See ACOP paragraph 332 on adequate testing. 356 To demonstrate that the full plan can be brought into effect all significant components of the emergency plan should be tested as part of a test regime within the three year test period. A test regime can be a single test or a combination of multiple tests that covers all components. Further guidance on the key elements of plans to be tested is available in NNEPRG [2] and could include for example: (a) notification to emergency responders (declaration and alerting); (b) facilities and equipment; (c) strategic coordination; (d) tactical coordination; (e) operational coordination; (f) warning & informing of the members of the public affected; (g) media strategy and coordination and communication; (h) technical advice; (i) protective action advice and consideration of vulnerable groups; (j) communications between emergency responders, including where appropriate mutual aid arrangements and national assistance; (k) information sharing systems and situational awareness; (l) radiation monitoring and decontamination; and (m) transition from response to the recovery phase. 357 In relation to point (m) above the transition to recovery requires early consideration of recovery needs to help inform the decisions made during the response phase and potentially avoid compromising medium to long term recovery. 358 In testing the transition to recovery, considerations should begin at the earliest opportunity following the onset of an emergency, running in tandem with the response phase to the emergency. 359 A test programme may be used to allow all components of the plan to be tested over a number of tests and within the three year test period. Operators or local authorities that wish to undertake such a programme should demonstrate how it will test all significant components of the plan. This should be done by producing a clear exercise programme and receiving agreement from the regulator before commencing the test programme. The local authority and operator should also seek agreement from each other where possible. 360 Significant components of a plan made under REPPIR may be the same for other non-REPPIR plans; a test programme may use tests of non-REPPIR plans as evidence of

Guidance 12(1)–12(7)	testing components of the REPPIR plan with agreement from the regulator. 361 Where such a test programme is undertaken, it is good practice to carry out a single test of the entire plan at least once every six years to ensure that the components of the plan can be delivered concurrently and cohesively. This does not mean all components need to be live tested, for example where it could be detrimental to health and safety, but they should be tested in some form. There may be exceptions to this, for example, if full-scale testing under COMAH has recently taken place that tested the majority of the same elements as a REPPIR test. 362 Where there has been successful testing of particular components of the plan over a series of previous tests, and there is high confidence in the plan and the capability to deliver those components, it may be proportionate to carry out a table top exercise for those components. 363 Where it is appropriate to do so and with the agreement of the regulator, the extent of testing required may take into account the response to a real radiation or non-radiation (e.g. evacuation for flooding) emergency that has confirmed the adequacy of certain elements of the plan. The use of the plan in response to a real emergency may also identify areas which require further rehearsing and testing. 364 The scenario for the test should vary in each three-year testing period in order to test over time the range of emergency responses required for the range of radiation emergencies which might arise. The use of different initiating events, releases and weather conditions will vary the scenario and the conditions for the response and help to avoid test participants becoming overfamiliar with specific scenarios. In planning the test scenario, consideration should be given to the variable factors in paragraphs 261and 263 to ensure it is sufficiently challenging. There is considerable benefit to be gained from making the test more challenging and stress testing the plan. Additional challenges such as coincident incidents, extreme weather or loss of essential services or equipment etc. will help identify further lessons and subsequent improvements to the plans and arrangements. 365 An active participation test is generally the most effective means to demonstrate an adequate test of the emergency plan. This may involve the deployment of on the ground resources in a simulation of their actual response to an emergency. Practical capabilities which could be tested in this way may include, for example and where applicable: (a) emergency services interface at the premises; (b) contamination control; (c) breathing apparatus, and other emergency equipment, use and control; (d) rest centres, for example setting up a rest centre using volunteers; (e) contaminated casualty handling, including radiological protection of response staff; and (f) the setting up and use of radiation monitoring units (RMUs) and other monitoring equipment, for example physical movement of RMUs to a location and simulation of the use of RMUs using volunteers. 366 Active participation tests need to be very carefully planned and risk assessed, paying particular attention to the safety of employees. These can be resource intensive, so it is important that when they are carried out the maximum benefit is gained from them and value for money is achieved. 367 Media arrangements should be tested with the involvement of all appropriate responding organisations. A wide range of communication channels are available for informing members of the public and testing should be able to demonstrate the use of those included in the emergency plan. The use of digital platforms should be considered, for example to test management of social media communications during the response to a radiation emergency.

Guidance 12(1)–12(7)	368 Simulators may be available to simulate emergency situations which enable emergency responders to develop their skills and responses. These systems should be able to simulate a real emergency as realistically as possible. Under some circumstances, such systems may be useful when carrying out table-top and communication tests. 369 If exceptional circumstances prevent the test of an emergency plan being completed within a three year period, the operator or the local authority as the case may be, may submit a written request to the regulator for an extension. The request should explain what the exceptional circumstances are and the regulator may agree to a longer period of time if it is satisfied that the circumstances of the request are exceptional and that an extension would be proportionate and would not impact on safety. The regulator would notify any such extension in writing. For example, if a significant material change is taking place at end of, or immediately after, the three year test period which will require a review and test of the emergency plan this may be considered exceptional circumstances. In such circumstances, the regulator may agree to an extension where it is proportionate to do so and providing the test is expected to take place within a reasonable time, usually within 6 months of the date it was due. Exceptional circumstances may also include those where resource is diverted to respond to a real emergency, radiological or otherwise, or where a number of participating organisations are unable to resource a test due to some unplanned event impacting those organisations. Exceptional circumstances should not include extending the three year period to meet operational and business needs. **Adequate testing of outline planning in the off-site emergency plan** 370 The local authority's off-site emergency plan relating to outline planning need not be tested unless requested by the regulator or where it is considered necessary to effectively review the plan. For example, where significant changes are made to the plan which affect outline planning a test of the outline planning arrangements should be undertaken to ensure the revised arrangements are adequate. Other situations may include, for example, where there are significant changes to the demographics and/or significant building or road construction in the outline planning zone. Consideration should also be given to the length of time since the last outline planning test and the extent of testing undertaken on that occasion. This will guide the decision as to whether a test of the outline planning may be required to effectively review and revise the plan. The local authority should cooperate with the operator when deciding whether a test of outline planning is required. 371 The regulator can request a test in writing to the local authority specifying in advance which parts of the emergency plan for the outline planning zone are to be tested and when it should be completed by. 372 Tests of outline planning should be proportionate to the level of planning and should be less extensive than tests for the detailed emergency planning zone or on-site emergency plans. Planning for outline planning zones may be tested through table top and modular exercises. See ACOP paragraph 333 on adequate testing. 373 The elements which might need to be tested in the outline planning zone do not differ from those in the detailed emergency planning zone. Some elements, such as urgent protective action, will be particularly relevant but should be tested in a proportionate manner. Where the local authority chooses to undertake an outline planning test, decisions would need to be taken by the local authority on what elements or aspects of outline planning should be tested and how this should be done. **Co-operation and Participation** 374 As r**e**quired by regulation 12(5) the local authority, operator and Category 1 responders must co-operate on how the off-site emergency plan is to be tested. This should include agreement on the overall objectives of the testing (which should be consistent with the purposes of emergency plans set out in Schedule 7 and other relevant

	regulations, ACOP and guidance) and the best way of meeting those objectives. A suitable scenario or scenarios will have to be developed from information in the consequences report (see regulation 7) together with any additional information provided by the operator, and the type and nature of the test will need to be agreed. It will be necessary to identify which organisations are to participate in the test and for each of these organisations to determine their own objectives. These should be consistent with the overall objectives of the test. 375 Clarifying objectives is assisted by the agreement by all participants of what is to be tested and what resources are required to demonstrate the adequacy of the plan. 376 If the local authority wishes to test other off-site emergency plans in conjunction with the REPPIR off-site plan, the local authority will have to endeavour to reach agreement with the various parties on how the test should be carried out. 377 Under regulation 12(1)(b) the local authority or operator must take reasonable steps to arrange for all those persons with a role in the relevant emergency plan to participate in a test to the extent necessary to test its effectiveness. Involving the relevant parties from the planning stage of the test should assist in securing their participation. An employer of any person whose participation is reasonably required by any emergency plan must co-operate with the operator or local authority to the extent necessary for compliance with REPPIR requirements. This includes the testing of the plan (see ACOP paragraph 408).
Regulation 12(8)-12(10)	*(8) After completion of the test required by paragraph (1)(b), each operator or local authority, as the case may be, must prepare a report on the outcome of the test within 3 months of the conclusion of the test.* *(9) A report made under paragraph (8) must be sent to the regulator within 28 days of its completion.* *(10) Where a report made under paragraph (8) was made by the operator, the operator must send it to the local authority within 28 days of its preparation, and where such a report was made by the local authority, the local authority must send it to the operator within 28 days of its completion.*
ACOP 12(8)	**378 The report on the outcome of the test should:** **(a) contain an overview of the exercise;** **(b) highlight the strengths and weaknesses of the emergency plan as shown by the exercise, focussing on areas where the plan was insufficient, or could not be implemented;** **(c) highlight areas where the operator's emergency plan and the off-site emergency plan were not aligned (where both plans are tested together);** **(d) include any lessons identified and recommendations to resolve these, including any required changes to the plan; and** **(e) include any significant actions associated with part (d) with an assigned action owner and agreed time to complete the action and implement any change.**
Guidance 12(8)-12(10)	**Evaluation of testing** 379 The regulator may assess the test(s) and make a judgement as to whether the test of the plan was adequate. The regulator will consider the relevant requirements of these Regulations and the points set out in ACOP and guidance. 380 A debriefing following an emergency plan test should be carried out in an open and blame-free atmosphere. This should allow any issues on implementing the emergency

plan to be identified, the reasons for the problems to be discussed and appropriate solutions to be considered, so appropriate improvements can be made.

381 To obtain the maximum benefit from testing emergency plans it is important to evaluate the lessons learned from the tests, to determine where revision is required to the emergency plans, and to implement the changes. The operator or local authority who owns the emergency plan that has been tested is responsible for undertaking a lessons learned review following the test. All those that participated in the test should be involved in considering what the impacts or implications of the test performance and plan would be in a real radiation emergency and identifying the areas where the objectives were not met together with any other areas for improvement. This should include any observations from the regulator. Organisations may set their own objectives such as quantitative measures for timeliness of response, or qualitative measures for effective performance. However, there should be consistency of approach for evaluating the effectiveness of the overall test and the interfaces between responding organisations.

382 During a lessons learned review it is important to identify the root cause of each shortfall together with a recommendation that includes rectifying action to be taken, an action owner or owners and a timescale for implementation, using the auditable management system referred to in ACOP paragraph 331. Existing governance arrangements which include local forums or other emergency planning groups should be used to oversee the progress of any actions relating to local issues. Where changes are required to the plan, the plan should be updated as soon as reasonably practicable.

383 Any lessons identified during a review or test should be shared with the appropriate organisations to promote relevant good practice. For example to other operators, local authorities, relevant organisations and to relevant government departments (regulations 12(9) and 12(10) require a report on the outcome of a test to be sent to the regulator and operator or local authority as appropriate). This can be done by sharing the lessons identified with regional or national forums for their consideration to develop and apply learning and address cross-cutting issues, where appropriate.

Report on the outcome of the test

384 The report of the test required by regulation 12(8) relates to the three yearly test required by regulation 12(1)(b) which should as a minimum cover all significant components of the plan (see paragraph 356). If the exercise was undertaken as a series of components making up the three yearly test, a report should be produced following each component so that any lessons can be identified as soon as reasonably practicable but this does not need to be submitted to the regulator under regulation 12(9). A report covering the whole test programme should be produced on the outcomes of the test programme as a whole and submitted to the regulator. It may be appropriate to tabulate each of the component tests in the report, including details of when and how each component was tested. ACOP paragraph 378 sets out what should be included in the report as a minimum.

385 Important points raised by participants should be included and participants should also have the opportunity to comment on the report and agree to any recommendations and actions prior to the report being finalised.

386 Regulation 12(4)(f) requires the outcomes of the report to be considered in a review of the plan. Significant actions should be captured in the report. It may be appropriate to use the organisation's name when recording the action owner, rather than names of individuals. There may be a number of other actions (e.g. minor updates to the plan) which do not need to be included in the report but should still be recorded. All actions raised should be tracked, using the auditable system referred to in ACOP paragraph 331, to close out the actions and identify any changes to the plan and the rationale for such changes.

387 The operator or local authority may choose to share the report, or parts of the

	report, with other organisations involved in the test or with a role in the plan to share learning.

Regulation 13 Cooperation: operator and local authority

Regulation 13(1)	*(1) The operator and the local authority must co-operate in respect of their duties to prepare emergency plans to ensure that—* *(a) the operator's emergency plan and the local authority's off-site emergency plan operate effectively both independently and in conjunction;* *(b) communication between the operator and the local authority is expedited during any radiation emergency; and* *(c) communication between the operator and the local authority and any organisation which is responding to the radiation emergency is expedited.*
Guidance 13(1)(a)	388 The operator and the local authority should have regular meetings to discuss the emergency arrangements as appropriate (and as a minimum an annual meeting). 389 The operator should review the relevant sections of the off-site emergency plan and the local authority should review the relevant sections of the operator's plan where the two plans interface, both during the preparation stage and at each revision as part of the consultations required by regulations 10(5) and 11(5). Where any potential incompatibility is found, the local authority and the operator should work together to align the plans. Care should be taken to identify which areas of both plans have any bearing on the other's plan and these areas should be noted and made known to the other party. Where information which may be sensitive (e.g. commercially or for security reasons) is provided to the local authority by the operator, any appropriate security requirements with respect to handling of this information should be followed. 390 Cooperation may be required for, amongst other areas, planning: (a) protective action that will be carried out on the premises either by the operator or the emergency services; (b) the allocation of resources, for example to ensure that there is sufficient resource where specialist emergency responders, equipment or assets are required by both the off-site and the operator's emergency plans; (c) how the emergency services will access the premises in the event of an emergency; (d) the use of emergency warning systems on premises such as alarms or lights; (e) evacuation protocols, routes and mustering locations that are situated outside of the premises; (f) the prior information to be sent to the public (required under regulation 21) and the information to be provided to the public in an emergency (required under regulation 22); and/or (g) how the members of the public will be alerted in the event of an emergency, for example, by automated telephone systems or by klaxon. 391 The operator's plan and the off-site plans should also work independently of one another. The operator's plan should be effective in the case that the off-site plan does not

	need to be triggered as is the case when the emergency can be contained and managed by the operator within the premises boundary (although responding organisations should be notified in this instance, and usually some stand-by action would be taken as indicated in the off-site plan). The off-site plan (or parts of it) should be able to be triggered independently of the operator's plan for example to enable communication arrangements to be activated as a result of a non-routine situation or event at the premises which could result in a perceived risk by the local population.
ACOP 13(1)(b) and (c)	**392 Communication methods should be agreed between the operator and the local authority and any other responding organisations and these methods recorded in the operator's and/or the off-site emergency plan(s) as appropriate.**
Regulation 13(2)	*(2) The local authority must, in particular, inform the operator which responder or responders should be contacted in order to provide early warning of a radiation emergency as required by paragraph 1(f) of Schedule 6.*
Guidance 13(2)	393 The local authority should provide the operator with detailed information on which organisations need to be notified and in which order of priority, the operator should contact during a radiation emergency. The operator's and/or off-site plans should detail how, the operator notifies those responding organisations with the details as specified in Schedule 6 Part, paragraph 2(c). 394 Communication may take place via telephone, mobile phone, fax, email, in person (for example if the operator sends representatives to any multiagency coordination centres), using a shared online platform and/or by any other methods that enable a reliable, timely and effective response, and with appropriate security measures taken into account. Communication systems should be effective under hazard conditions. 395 The initial notification including information about the incident is usually given to the emergency services (via the 24-hour operational control room). That information is then cascaded to other responding organisations (including the local authority), so far as the arrangements are described within the off-site and/or the operator's emergency plans. 396 The information that the emergency services and other relevant responding organisations will need from the operator during the emergency should be agreed and recorded in either the off-site emergency plan and/or the operator's emergency plan. Information should be provided using METHANE, which is the Joint Emergency Services Interoperability Principles (JESIP) [33] recognised common model for passing incident information between services and their control rooms. Information should be updated and expanded on using the METHANE standardised model as the emergency develops. Arrangements should also specify the mechanism by which the local authority or other responding organisations can request further information from the operator during the emergency and how this will be provided as soon as reasonably practicable after it becomes available. The operator should consider within their plans how any uncertainty associated with any predictions or estimates will be conveyed to the responding organisations.

Regulation 14	Cooperation between local authorities
Regulation 14(1)-14(2)	*(1) A local authority may request, in writing, the cooperation of another local authority in order to—* *(a) make or review its off-site emergency plan; and* *(b) test its off-site emergency plan as required under regulation 12(1)(b).* *(2) Where a local authority has made a written request of another local authority under paragraph (1), the local authority which has received such a request must, as soon as reasonably practicable, cooperate in assisting the requesting local authority in both making and testing the off-site emergency plan.*
ACOP 14(1)-14(2)	**397 Where the co-operation of another local authority is requested, the lead local authority should provide the cooperating local authority with details of the activities that the cooperating local authority is required to carry out to assist in the drafting, review and / or testing of the off-site emergency plan, along with associated timescales for completion.** **398 Where the assistance of another local authority is requested, a clear description of the role of that cooperating authority together with its responsibilities should be included in the lead local authority's off-site emergency plan.**
Guidance 14(1)-14(2)	399 The lead local authority may require another local authority to assist in the drafting, reviewing and testing of its off-site plan. A request may be required if, for example, a section of the detailed emergency planning zone or the outline planning zone falls in the jurisdiction of the other local authority, or if resource is required from the other local authority (e.g. if rest centres are located within, and managed by that other local authority). 400 The lead local authority should draw up a schedule of activities for drafting, reviewing, revising and testing the off-site emergency plan and this should be shared with any other relevant local authorities via existing local forums or partnerships. Working to a schedule of activities is reasonable to expect, since it reduces the burden of ad-hoc requests and should enable the other local authority/authorities to provide an adequate contribution to the regulatory tasks. 401 Assistance may take the form of attending planning meetings, providing information for the off-site plan, providing and maintaining capabilities or facilities, reviewing the off-site plan and/or assisting in the organisation of, or participation in tests or any other relevant activity specified by the lead local authority. 402 Where the other local authority is not able to fulfil the request in full, they should inform the lead local authority without delay. The two local authorities should then work together to find a solution that is suitable to both parties. 403 The lead local authority should consult any relevant local authorities on the off-site plan, or changes to that plan with respect to the role and responsibilities of that local authority (as required by regulation 11(5)). Similarly, the lead local authority should consult any other relevant local authority in the preparation of information that will or might be provided to persons within the jurisdiction of that other local authority (as required by regulations 21(4) and 22(3)). 404 The lead local authority should make available a copy of the off-site emergency plan to any local authority that has duties under the plan, or who has co-operated in its' preparation or review.

	405 Where other tiers of local government are required to assist the lead authority (other than those within the definition of local authority such as borough or district councils that are not unitary authorities), these may be required to do so under regulation 15(3). In this case similar arrangements can be made to those described above.

Regulation 15 Consultation and cooperation: employers

Regulation 15(1)-15(2)	*(1) In performing the duties imposed on an operator under regulations 4(1), 5(1), 6(1) and (2), 7(1) and 10, that operator must consult any other employer who carries out work with ionising radiation on the premises and take into account relevant matters arising from that consultation.* *(2) Any employer who carries out work with ionising radiation at premises to which these Regulations apply must cooperate with the operator of those premises or the local authority in whose area the premises is situated by providing information or otherwise to the extent necessary to ensure that the operator or local authority, as the case may be, is able to comply with the operator and the local authority's duty to prepare an emergency plan.* *(3) Any employer of any other person whose participation is reasonably required by any emergency plan required under these Regulations must cooperate with the operator or the local authority, as the case may be, in the exchange of information or otherwise to the extent necessary to ensure that the operator or the local authority is enabled to comply with the requirements of these Regulations, in so far as the operator or the local authority's ability to comply depends on such cooperation.* *(4) The cooperation required by an employer under paragraphs (2) and (3) extends to cooperation in the testing of emergency plans where such cooperation is necessary to secure compliance with regulation 12.*
ACoP 15(1)-15(4)	**Duties on Operators** **406 In relation to regulations 4(1), 5(1), 6(1), 6(2), 7(1) and 10, the operator should:** (a) **request the details of relevant employers' work involving radioactive material in advance of drafting the hazard evaluation, and at each review of that evaluation.** (b) **consult any employers on the premises that have a role in the operator's emergency plan on that role when drafting the plan, or on any changes to that role on revision.** (c) **consider how relevant information obtained from the consultation with employers informs the hazard evaluation, the consequence assessment, reviews of either the evaluation or the assessment, or the operator's emergency plan.** **Duties on Employers on Premises** **407 Employers should:** **(a) on request, provide the operator with a description of their work with ionising radiation that involves radioactive material on the premises, advise the operator of any material change to their work with radioactive material**

	on the premises, wherever practicable prior to that change. **(b) put into place any reasonable measures that enable them to carry out their role in the operator's emergency plan within an agreed timeframe.** **(c) Participate, as required, in the test of the operator's or the off-site emergency plan(s).** **Duties on Employers** **408 Employers of any other person whose participation is reasonably required by an emergency plan should:** **(a) on request and in an agreed timeframe, provide to the local authority or to the operator, details of procedures, employees, training, equipment or any other relevant information that is required to enable the local authority or the operator to perform their duties under these Regulations;** **(b) Put into place any reasonable measures that enable them to carry out their role in an emergency plan in an agreed timeframe; and** **(c) Participate, as required, in the test of the operator's or the off-site emergency plan(s).**
Guidance 15(1)-15(3)	409 Compliance with these Regulations is in addition to the cooperation required between employers under the MHSWR [20]. **Employers and Operators** 410 There may be a number of employers working with ionising radiation on a single premises (see guidance paragraphs 14-23 on the definition of 'premises' in regulation 2(1)). In such a case, if and where the total quantities of radioactive substances on the premises exceed the REPPIR thresholds (listed in Schedule 1), the operator of that premises must undertake a hazard evaluation (see regulation 4) and if required, a consequence assessment (see regulation 5) and prepare an emergency plan (see regulation 10) that takes account of all the radioactive substances on those premises, regardless of whether they are held or used by one or more employer(s). In addition to the details of work with ionising radiation recommended by the ACOP above, the operator may also wish to request a copy of the employer's risk assessment, or consult on the draft or updates to the hazard evaluation, the consequence assessment or the operator's emergency plan. Consultation on the operator's plan is required if the employer has a role specified in it. In this case, the employer is required to assist in the tests of the operator's plan in addition to carrying out relevant training, obtaining and maintaining facilities or equipment, or taking any other measures that would ensure they could carry out their role. **Employers and Local Authorities** 411 Some employers on premises are required to work with the Local Authority in the production, review and testing of the off-site emergency plan in the case that the local authority requests assistance. For example, an emergency service that is employed by the operator and specific to the premises may be required to work closely with attending emergency services in which case their discrete roles together with their interactions should be recorded in the off-site and/or operator's emergency plans. Employers on premises, the operator and the local authority must all work together when reviewing and testing the consequence assessment and emergency plans. 412 Regulation 15(3) requires that all employers of persons whose participation is reasonably required in an emergency plan must cooperate with the local authority or operator, as appropriate, throughout the process of preparation, review and testing of that plan. Assistance may take the form of attending planning meetings, providing

information for an emergency plan, providing or maintaining capabilities or facilities, reviewing emergency plans and/or assisting in the organisation of, or participation in tests or any other relevant activity specified by the operator or the local authority.

413 Employers include category 1 and 2 responders, local authorities (including neighbouring authorities and those within other tiers of local government), voluntary organisations, the military, businesses and other organisations within the planning zones as required.

414 Cooperation should make use of existing structures such as forums or partnerships which allow good working relationships to develop, which would be important during an emergency. Relevant information should be shared freely and frequently between those involved in the forum/partnership both at and between meetings. The process of establishing relationships in a forum or partnership will enable the development of shared objectives. This facilitates the production or review of plans, and readiness, due to a shared understanding of emergency arrangements. Cooperation between organisations enables, for example:

(a) the co-ordination of training to ensure there are sufficient staff across all responding organisations;

(b) the management of a common information sharing platform for use during an emergency;

(c) the management of facilities that are suitable for all responding organisations (for example at co-ordination centres);

(d) the identification of best practices and areas for improvement following tests of the plans to enable continuous improvement,

(e) the arrangements for communication with all stakeholders and the members of the public across the full range of media in the event of an emergency, and

(f) the use of commonly agreed terminology and definitions.

415 Where an employer is not able to fulfil a request made by the operator or the local authority, they should inform the relevant party without delay and work together to find a solution that is suitable for both parties.

Operators and Emergency Services

416 The operator should share any relevant information with the emergency services to enable them to estimate potential emergency exposures for their employees. The operator will also be required to provide any other information to the local authority for the off-site emergency plan that enables the emergency services to respond on the premises (in accordance with regulations 10 (6) and 10(7)). This information might take the form of; the location of water sources, hazards and emergency routes within the premises in addition to any actions that the operator will be taking that might affect the emergency services' response. The operator and the emergency services may wish to carry out joint training on the premises to familiarise staff with each other's emergency procedures and the premises itself.

Co-operation between Operators at Ports and Airports

417 If there is more than one berth or transit shed handling REPPIR quantities of radionuclides at the same port or airport, the operators must cooperate with each other. DGHAR requires harbour authorities to consult berth operators when preparing their emergency plans. Such cooperation is particularly important in view of the potential risks from radioactive substances being moved or stored in the port which may have implications for adjacent employers handling quantities of radioactive substances below REPPIR thresholds.

Regulation 16 Charge for preparation, review and testing of emergency plans

Regulation 16(1)-16(6)	*(1) A local authority may charge the operator a fee for the performance of the local authority's functions in relation to the off-site emergency plan relating to the operator's premises under regulations 8, 11, 12 and 21.* *(2) The fee charged under paragraph (1) must not exceed the sum of the costs reasonably incurred by the local authority in performing its functions referred to in that paragraph including any costs reasonably incurred in arranging for any participants to take part in the testing of the off-site emergency plan.* *(3) When charging the operator a fee in accordance with paragraph (1), the local authority must provide the operator with a detailed statement of the costs incurred, and the period to which the statement relates.* *(4) The local authority's fee under this regulation is payable one month after the statement required under paragraph (3) has been provided, unless, within that period, the operator informs the local authority in writing that it considers that its costs are unreasonable and requests additional information from the local authority concerning its costs.* *(5) Additional information requested under paragraph (4) must be provided by the local authority within 28 days from the day on which it received that request, and the period for payment of the fee provided under that paragraph is extended for a further period of two months from that date.* *(6) A fee charged under this regulation is recoverable as a civil debt.*
Guidance 16(1)-16(6)	**Overarching principles and framework** 418 The following principles, so far as reasonably practicable, should be followed for fees charged. Regulation 16 provides for fees which are: (a) solely for the purpose of the local authority fulfilling a duty under regulations 8, 11, 12 or 21; (b) for those costs reasonably incurred; (c) fair, proportionate and commensurate to the duty and potential consequences of a radiation emergency; and (d) either for staff time or capital spend. 419 These principles are in line with those set out in the HM Treasury publication Managing Public Money [34] which provides further guidance on charging fees for providing services by public sector organisations. 420 The local authority and the operator should agree an overarching framework that describes the range of activities or capabilities for which fees, in relation to regulations 8, 11, 12, or 21 can be charged. The framework should specify how any disputes will be resolved. The framework should be a written agreement that is reviewed periodically to ensure that it currency is maintained. 421 Where other organisations are required to support the local authority in compliance with regulations 8, 11, 12 or 21, the local authority can charge the operator reasonable costs that it has to pay other organisations for contributing to preparation, review and testing of emergency plans.

Charging Mechanism

422 In addition to the overarching framework, the local authority and the operator should agree the mechanism by which fees should be claimed. The two parties should agree, for example; the time constraints for the receipt of forecasts and itemised costs, the level of detail to be provided within those forecasts and itemised costs, the preferred methods of sending information between the two parties, and the arrangements for the financial transaction. The charging mechanism should be transparent but should not overburden local authority staff.

423 The local authority should forecast costs in advance as far as is reasonably practicable and provide these to the operator at least one month before work commences, or alternatively, according to a timeframe agreed between both parties.

424 The local authority and the operator should jointly establish a mechanism to agree variations to the forecast.

425 An itemised statement of costs incurred should be provided to the operator promptly following the completion of work.

426 Any unavoidable costs that are not known in advance of work commencing should be an exceptional circumstance, be highlighted to the operator and meet the above principles in (a) to (d).

427 Charges should be based on the time spent by officers of the appropriate grades and any associated travel and capital costs. The staff time cost is calculated from the costs of staff salary and benefits, plus a fair proportion of overheads based on the time spent. Capital costs may include for example website investment or leaflet production and distribution relating to the duty to provide prior information to the public.

Setting the detailed emergency planning zone

428 The local authority may charge reasonable fees for determining, and where appropriate, amending the detailed emergency planning zone. Costs may be charged for the time spent in reviewing the operator's consequence report, identifying the zone boundaries and producing maps. Costs may also be charged for liaising with other organisations to identify emergency response and planning issues or improvements that may affect the extent or boundaries of the zone.

Local authority's off-site emergency plan

429 The local authority may charge reasonable fees for preparing, reviewing and revising the off-site emergency plan. Costs may also be charged for the local authority's duties to consult the statutory consultees on that plan (as required by regulation 11(5)). This includes costs for seeking advice from PHE-CRCE under regulation 11(5) (f).

430 Capital costs may be charged for essential items and services specifically required by the off-site plan. For example, those associated with providing, storing or distributing stable iodine if it is required by the plan.

431 The costs associated with the hiring, purchase or maintenance of facilities and equipment that are required for both the off-site emergency plan in addition to general emergency response arrangements may be charged in part. For example, an agreed proportion of the costs associated with maintaining a joint operation centre may be charged if the facility differs for REPPIR purposes from what it would for general emergency response functions. The proportion of costs should be based on a pre-agreed estimation of this difference.

Test of the off-site emergency plan

432 The fee that local authorities may charge for testing their off-site emergency plan should only cover the reasonable costs of testing to make sure that the plan is effective at mitigating the consequences of a radiation emergency and can be implemented. If the test

is made broader than this for other reasons, such as to provide training opportunities, then charges should not be extended to cover the additional costs. Costs may be claimed for participants from other organisations that have a defined role in the off-site emergency plan and deemed necessary to test the off-site emergency plan, for their time in preparing for and participating in that test. This may include attending familiarisation activities that are specific to the test and/or post-test debriefs.

433 If only part of the off-site emergency plan is tested, reasonable fees may only be made for the activities and participating persons with a defined role in the off-site emergency plan that are necessary to test that part. If the test includes elements required by other regulations such as COMAH, or CCA, or it is undertaken for any other reason other than those necessary for REPPIR, fees may only be charged for those elements that fall under REPPIR.

434 Reasonable fees may be charged for the activities required to prepare for a test and for the production of the report on the outcome of the test as required under Regulation 12(8).

435 Reasonable fees associated with testing the transition to the recovery phase (referred to an existing exposure condition in these Regulations) may be charged. Although, costs associated with testing the recovery phase are not chargeable.

436 The local authority may charge fees for costs associated with the hiring, purchasing or maintaining of facilities or equipment required during the test if, that facility or equipment is required solely or partly for testing the REPPIR off-site emergency plan. If the facilities or equipment are required only in part for testing the REPPIR off-site emergency plan and are also used for testing or during general emergency response, then a proportion of costs may be claimed. This proportion should be pre-agreed between the local authority and the operator.

437 The overarching framework should identify how costs will be apportioned in the circumstance that a full or partial retest of the off-site emergency plan is required by the enforcing authority.

The provision of prior information to the public

438 The local authority may charge reasonable fees for preparing, reviewing, revising and distributing prior information that they are required to provide to those residing or working in the detailed emergency planning zone and make available to those in the outline planning zone as required by regulation 21.

439 Where prior information forms part of an integrated communications approach, reasonable costs for the part relating to REPPIR activities or capabilities may be recovered.

Other Charges

440 In addition to the costs set out above, reasonable fees may be agreed with the operator for:

(a) the time of staff from other organisations to prepare for, participate in, or review the outcomes of a test of the off-site emergency plan as referred to in paragraph 380.

(b) considering and implementing material changes which may impact on the detailed emergency planning zone or the off-site emergency plan. Any such costs must directly relate to the consideration of the impact of that change on relevant REPPIR duties and activities undertaken to implement those changes. For example, costs may be recovered for considering revision to the detailed emergency planning zone and/or for updating the off-site emergency plan if planning permission was sought for a new development within or adjacent to a REPPIR emergency planning zone.

(c) Local authority attendance at meetings where the main purpose is to assist in fulfilling the duties specified under 16(1). For example, the local authority may claim for attending a meeting that is directly related to reviewing or updating its off-site emergency plan, determining the detailed emergency planning zone or regarding the provision of prior information to the public.

441 The local authority should make use of existing forums where practicable to reduce the costs for duties that require input from other organisations.

442 The local authority may decide to contract out some of the work to another organisation. In this case the authority may recover the costs of the contract from the operator. In the case that work is contracted outside the local authority, the costs should be fair, reasonable, specific to the duty placed on the local authority under REPPIR, and wherever practical, agreed in advance.

443 Fees cannot usually be charged by the local authority for activities in support of co-ordinating or providing training, personal protective equipment, monitoring equipment or medical surveillance for employees that could potentially receive emergency exposures whilst implementing emergency plans. There may be exceptions to this, for example in the case that monitoring equipment is required under the off-site emergency plan where national capability would not be available in appropriate time periods to monitor members of the public in the event of a radioactive release. In this case, the cost for acquiring and maintaining this equipment could be claimed. However, it is the expectation that the majority of costs associated with training, personal protective equipment, monitoring or medical surveillance will be for the operator, or for category 1 responders and that each organisation will bear their own costs.

444 Where travel is required to fulfil duties under the specified regulations (8,11,12 & 21), reasonable costs for travel and accommodation may be charged. In this case general limits should be agreed between the operator and the local authority that relate to all travel costs in advance of commencing work. These limits should be in line with spending rules that are already in place either for the local authority or for the operator's staff.

445 The above guidance is not exhaustive; other reasonable costs may be charged provided that they meet the overarching principles and are agreed within the overarching framework.

Dispute

446 The local authority and the operator should make all reasonable endeavours to agree the reasonable costs to be covered between them, in line with the co-operation required by REPPIR. Should there be a dispute between the operator and the local authority on fees owed, an independent mediator could be used. Ultimately if agreement cannot be found, the dispute may be taken to the civil courts for a resolution.

Regulation 17 Implementation of emergency plans

Regulation 17(1)-17(3)	*(1) An operator who has prepared an emergency plan pursuant to regulation 10 must take reasonable steps to put it, or such parts of it as are necessary, into effect without delay—* *(a) when a radiation emergency occurs; or* *(b) if an event occurs which might lead to a radiation emergency.* *(2) When an operator takes the steps set out in paragraph (1), the operator must at the same time inform the local authority in whose area the premises is situated and the regulator that the operator has put its plan into effect.* *(3) A local authority which has prepared an off-site emergency plan pursuant to regulation 11 must take reasonable steps to put it, or such parts of it as are necessary, into effect without delay when informed by the operator that —* *(a) a radiation emergency has occurred; or* *(b) an event has occurred which could give rise to a radiation emergency.*
Guidance 17(1)-17(3)	447 In the event of a radiation emergency or an event which might lead to a radiation emergency, delays in implementing emergency plans should be minimised. Discussions to ensure that delays are minimised should take place with all statutory consultees during the preparation of emergency plans. 448 Declarations can be defined and used to indicate whether an incident has occurred, is likely to occur, and what the potential consequences are. For example, in the nuclear industry these may include: (a) Site incident - a hazardous condition, which is confined in its effect in the boundary of the site security fence. (b) Off-site nuclear emergency - a hazardous condition which results, or is likely to result, in the need to implement protective action to protect members of the public beyond the site boundary from a radiological hazard. 449 An event could occur which is perceived as a radiation emergency off-site but will not result in irradiation or a release of radiation (e.g. a conventional emergency involving emergency services response, a false alarm on a perimeter monitoring system or a routine operation such as a steam release that could be observed locally). Such an event meets the definition of a radiation emergency and requires implementation of emergency plans. In these situations, communications elements of plans should be implemented to manage local concerns and queries. It is good practice for the local authority to supply such information to the public to provide reassurance and to ensure there is no cause for undue alarm. 450 In the event of abnormal conditions being suspected, operators should act to halt, contain and control any release of radiological material or halt, shield and control any irradiation. The operators should follow defined and rehearsed procedures to investigate, assess and, if required, declare a site incident or off-site nuclear emergency or other such declaration as defined in emergency plans. The investigation and assessment that is undertaken at this stage is to enable a decision on the appropriate declaration state. The operator should aim to make a declaration within 15 minutes of symptoms being detected and assessed. Arrangements should be in place to ensure that the person making the declaration is aware of the indicators of a potential radiation emergency and the appropriate notification and protective action warranted to be taken immediately in an

	emergency. There should be a clear and logical decision-making system in place. 451 An emergency plan should be implemented in the event that the operator was operating outside its normal operating arrangements and an expected escalation or loss of control is anticipated or likely. 452 Emergency plans should explain roles and responsibilities (see Schedule 6). 453 If there is an alarm system as part of the arrangements, there needs to be agreement as to who will initiate any alarm and this should be documented in the emergency plan. It may be appropriate for an employee of the operator to be identified (by name or position) as having the responsibility for sounding any off-site alarm/siren. Alternatively, sounding an off-site alarm could be the responsibility of an external organisation. 454 The process for alerting off-site organisations will follow locally agreed arrangements. An established and robust cascade alerting system will then be instigated to inform both local and national levels. This should include arrangements for the operator to notify the local authority, emergency services, health authority/board, relevant Agency, regulator and other organisations as appropriate of a radiation emergency or an event which may escalate into a radiation emergency. These arrangements should be described in the emergency plans (see Schedule 6). 455 As soon as the operator (or a body acting on the operator's behalf, such as the police service) has informed the responding organisations that a radiation emergency or an event that is likely to lead to a radiation emergency has occurred, the off-site emergency plan must be implemented without delay in accordance with the agreed arrangements. The persons specified in the off-site emergency plan as being authorised to initiate the plan should take action without delay. Responding organisations should implement their own emergency arrangements when an appropriate notification is received. 456 In an escalating situation, the operator's emergency plan would be implemented. If the situation does not develop or is contained within the premises, the off-site emergency plan may not be implemented at all. In practice this would be rare as the assistance of responding organisations at the premises is within the off-site plan. It could also be activated as a precautionary approach if it is possible that the incident could escalate. Elements of the off-site plan, such as alerting of emergency responders, information sharing and public communications, might be required to ensure that the full plan can be implemented quickly if the situation at the premises deteriorates. The off-site plan would be expected to be implemented for an off-site nuclear emergency. 457 The duty to implement the operator's and off-site emergency plans lies with the operator and the local authority respectively. Although, by agreement (and in accordance with the procedure written into the appropriate emergency plan) someone acting on their behalf. For example the police or fire and rescue service, may initiate the emergency plan. The operator or local authority will have discharged this duty when there are systems in place to ensure there are no unreasonable delays between the discovery of a radiation emergency (or event which might lead to a radiation emergency) and activation of the operator's emergency plan or local authority's off-site emergency plan. 458 When the operator informs the regulator of an event occurring or potentially occurring that might lead to a radiation emergency in accordance with 17(2), the operator should supply the regulator with a representative range of source terms (see definition in Schedule 3(9)) and description of the event. The source terms provided should be relevant to the radiation emergency that has occurred or that might occur and should be provided as soon as reasonably practicable following the emergency plan being put into effect. The operator should provide such source terms in a form suitable for use in the UK national emergency response arrangements as noted in guidance supporting Regulation 4(7). During the initial stages of a response, this radiological data and description of

	events occurring will inform decisions on off-site protective action.
Regulation 17(4)	*(4) In the event of a radiation emergency occurring, or on the occurrence of an event which could give rise to a radiation emergency, the operator, with the local authority that has prepared an off-site emergency plan, must make a provisional assessment of the circumstances and consequences of such an emergency, and for this purpose must consult—* *(a) the emergency services;* *(b) the health authority in whose area the premises to which the emergency plan relates is situated;* *(c) the health bodies set out at regulation 10(5)(e) and (f) and 11(5)(f) and (g) respectively;* *(d) the Agency; and* *(e) any other persons, bodies or authorities which have functions under the operator's emergency plan, or the local authority's off-site emergency plan.*
Guidance 17(4)	459 When an emergency plan is implemented, the priority will be to ensure effective mitigation. 460 As soon as is reasonably practicable following the start of the radiation emergency, a provisional assessment must be made of the circumstances that led to the radiation emergency occurring, or the occurrence of an event which could give rise to a radiation emergency. The provisional assessment should provide an understanding of what is happening at the premises to inform the protective action to be taken to protect people, control the event and mitigate the consequences. Information as referred to in paragraph 458 should be provided. 461 Records should be kept of radiological data, events, decisions taken and actions carried out, as appropriate. The records of radiological data etc. will inform the provisional assessment of the circumstances and consequences of such an emergency. This should also include an initial assessment (or estimation) of doses received by people, and the likely effect on the environment which may affect people, such as implications for foodstuffs and drinking water. Data necessary for the provisional assessment may include personal dosimetry, *in vivo* monitoring, workplace monitoring and environmental sampling. Information necessary for the provisional assessment may include an analysis of the structural integrity of the plant, and an evaluation of the success of the protective action taken. The circumstances that contributed to stopping any release should also be included as part of the provisional assessment. This will inform decisions on how to maintain the integrity of the source, and how to move forward into the recovery phase. Arrangements for assisting in the transition to recovery should be detailed in emergency plans as per Schedule 6 Part 1 (1)(n) and Schedule 6 Part 2 Chapter 1 (2)(k) and paragraph 739.
Regulation 17(5)-17(9)	*(5) The assessment required by paragraph (4) must take place as soon as reasonably practicable in order to respond effectively to the particular characteristics of the radiation emergency.* *(6) The operator must as soon as is reasonably practicable and in any event within 12 months, or such longer time as the regulator may agree, make a full assessment of the consequences of the radiation emergency or other event and the effectiveness of the emergency plans put into effect in accordance with paragraph (1).* *(7) The local authority must co-operate with the operator in making the operator's assessment of the effectiveness of the emergency plans as required by paragraph (6).* *(8) The operator must, within 28 days of the day on which the assessment made under*

	paragraph (6) is completed, make a report of the findings of that assessment and retain that report or a copy of that report for at least 50 years from the date on which the report was completed. *(9) The operator must provide the regulator with a copy of the report made under paragraph (8) within 28 days of the day on which it was completed.*
Guidance 17(5)-17(9)	462 The operator with the help of the local authority must complete its full assessment as soon as practicable, and in any event within one year of the radiation emergency occurring. If a longer period of time is necessary to complete the assessment, this must be agreed with the regulator. Other statutory processes (e.g. public inquiries, investigations by the regulator or police) may impact on the ability of the operator to complete an assessment within one year and these impacts should be notified to and agreed with the regulator. 463 The full assessment should consider what happened, how effective the plan was and how learning can be incorporated to ensure more effective emergency planning and response in the future. Although, learning would be expected in all situations when emergency plans were implemented, the assessment undertaken should be proportionate to the event that occurred. For example, if the event was as a result of a perceived risk the assessment would not be expected to be as extensive in comparison to an off-site nuclear emergency involving release of radioactive materials to surrounding areas. The operator should lead on the assessment of the effectiveness of the operator's plan and the local authority should lead on the assessment of the effectiveness of the off-site emergency plan. The full implications of the radiation emergency may not be known for some time following the event. Dose assessments of internal radiation from long-lived radionuclides, such as actinides, may take many months to complete. The effects of contamination on crops, animals and fish, and their effects on the food chain may continue for many months. The impact of radioactive waste arising from the radiation emergency may also need to be assessed. Therefore the time in which a full assessment of the radiation emergency can be made will depend on the nature of the emergency. 464 When making both the provisional and full assessment of the event, the operator should consult with all responding organisations with a role in the operator's emergency plan. The local authority should consult with all responding organisations with a role in the off-site plan. 465 A key purpose of full assessments is to ensure knowledge is gained from the emergency, the response to it and the transition to recovery. The assessment report should include: (a) the consequences of the event, (b) what went well (c) what did not go well, (d) how effective the plan was, (e) lessons identified; and (f) recommendations and actions for improving emergency plans (see regulation 12(4)(e)). 466 Lessons learned should be shared locally through local resilience networks and nationally where appropriate through the joint organisational learning process. The off-site emergency plan should be updated to incorporate relevant learning as per Schedule 6 Part 2 (2)(j).

Regulation 18 Emergency exposures: employees

Regulation 18

467 An emergency exposure is defined in regulation 2 as a dose which could exceed the dose limits in the 2017 Regulations. Emergency exposures can only be received by emergency workers.

468 Decisions about the need for emergency exposures of employees and the emergency dose levels that apply are an integral part of emergency plan development. Operators should address these issues in an integrated way so that emergency exposure and dose level decision-making informs the process of intervention strategy development rather than becoming a last resort course of action in radiation emergency management. Emergency exposure arrangements provide the framework within which to manage the exposures of emergency workers who are likely to receive the highest doses and keep these doses as low as is reasonably practicable. Appropriate emergency management arrangements ensure that emergency responders are not put at unnecessary risk, which ensures that they are not exposed to unnecessary radiation doses.

469 The operator should seek advice from a radiation protection adviser on emergency exposures. The operator should also have arrangements for providing information on radiological conditions and hazards on the premises associated with the radiation emergency to the employers of other emergency workers, such as the emergency services.

470 The provisions of regulation 18 only apply for those incidents where a risk evaluation has identified the possibility that exposures to emergency workers in excess of the dose limits in the 2017 Regulations could occur, and where appropriate provision has been made in the emergency plan. The dose limits in the 2017 Regulations continue to apply to all persons who are not identified as emergency workers.

471 Emergency exposures may be necessary for emergency workers in the event of a radiation emergency but also before a radiation emergency is declared in order to prevent escalation or to mitigate consequences. Arrangements for determining when emergency exposures would be necessary must be written into emergency plans (see Schedule 6). It is unlikely that emergency exposures would be required for employees working off-site, but this possibility is not excluded by the Regulations. Therefore, if the off-site emergency plan includes arrangements for such emergency exposures, the provisions of this regulation will apply, and arrangements for the management of those exposures for off-site employees will be necessary.

472 In the event of an incident occurring which could lead to the authorisation of emergency exposures, expert advice on radiation protection should be available. Arranging for expert(s) to be available should form part of the emergency plans. Such experts may be RPAs as appointed under regulation 24, or they may be other individuals with appropriate qualifications and experience. Operators should provide emergency responders with information on the radiological conditions and hazards on the premises associated with the radiation emergency.

473 This regulation provides a management framework for controlling the exposure of emergency workers. The elements of this framework are as follows:

(a) planning - identifying emergency workers who can receive emergency exposures; ensuring they are prepared for the task by provision of training and equipment; making arrangements for medical surveillance and dosimetry that would be required; naming those who would take charge of managing emergency exposures; and specifying limiting dose levels for emergency exposures;

	(b) implementation - checking that those who will receive emergency exposures are fit to be exposed and are properly equipped and instructed; managing the exposure of the emergency workers; ensuring that the limiting dose levels are not exceeded except in extreme situations to save lives; and determining the doses received in the emergency exposure; (c) documenting the emergency exposures - ensuring that dose records are made and kept by approved dosimetry services; providing copies to affected employees; and making a report of the circumstances of emergency exposures and resulting actions. 474 The regulation places a number of duties on employers. This is because the duties refer to employees who may receive emergency exposures, and it needs to be clear that the duties fall on the employers of those employees, whether they be operators, or others, such as the emergency services. All the requirements that apply to emergency exposures stem from the identification in an emergency plan that emergency workers might receive high doses of radiation, exceeding normal dose limits. 475 The Regulations permit an employee, during a radiation emergency or where action is required to prevent such an emergency, to receive a dose of ionising radiation in excess of the dose limits in the 2017 Regulations. This would include employees of the operator, contractors on the premises, emergency services and other emergency responders (such as care assistants for people living in an affected area, bus drivers involved in evacuation of employees or volunteers (as per regulation 18(11)) with a defined role in the emergency plan. Emergency workers must only be allowed to receive emergency exposures for the purposes of bringing help to endangered persons, preventing exposure to other persons, or saving valuable installations or goods. This last circumstance would be particularly important if the integrity of the installation is crucial to the stability or containment of a radiation source. Indeed, emergency exposures may be authorised for emergency workers that are based at the premises before the release of any radioactive substance occurs from the premises and before the off-site emergency plan is formally implemented. 476 In the event that emergency exposures are or are likely to be necessary, the employer (operator, emergency service or other responding organisation) will need to manage the exposure to ionising radiation of emergency workers that they employ. One vital function is to authorise emergency workers to receive emergency exposures (see regulation 18(1)(g)) for which they need to have appropriate training.
Regulation 18(1)(a)	*(1) Where an emergency plan prepared pursuant to these Regulations provides for the possibility of any employee receiving an emergency exposure, each employer must, in relation to that employer's employees—* *(a) identify those employees who may be subject to emergency exposures;*
Guidance 18(1)(a)	477 Each employer should identify those employees, or where appropriate groups of employees, who may receive emergency exposures. This may be by name, or by position or role (such as shift charge engineer, driver, or firefighter). If by position or role, then all individuals having that position or role should be known and be trained to undertake it. All employees on premises should not be identified to receive emergency exposures by default even if they have a role in an emergency plan (see emergency exposure in regulation 2(1)). For example, employees gathering at a muster point or undertaking a role in an emergency control centre should not be expected to receive doses greater than the dose limit unless justified. Emergency exposures should not be used as a means to avoid the need to keep doses as low as reasonably practicable. 478 Certain groups are not suitable for work incurring emergency exposures. These include those listed in regulation 18(6) (i.e. employees and trainees or apprentices under 18 years of age, and female employees who are either knowingly pregnant or

	breastfeeding). In other cases, consideration should be made as to whether an individual is suitable, taking account of medical advice where appropriate. 479 It is not necessary for those identified to be designated as classified persons under regulation 21 of the 2017 Regulations. Radiation emergencies are such rare events that they do not in themselves give rise to a duty to designate classified persons under that regulation. On the other hand it is quite in order to identify people who for their normal work are designated as classified persons. 480 In paragraph 86 of the ACOP to the 2017 Regulations, it is recommended that doses received by employees who would not normally be exposed to ionising radiation in the course of their work should be kept below the dose limits which apply to members of the public. It should be noted that the guidance in that paragraph is not relevant to REPPIR and should not be seen as preventing particular individuals being identified for being subject to emergency exposures.
Regulation 18(1)(b)	*(b) provide those employees with appropriate training in the field of radiation protection and such information and instruction as is suitable and sufficient for them to know the risks to health created by exposure to ionising radiation and the precautions which should be taken;*
Guidance 18(1)(b)	481 The information, instruction and training received by employees should be fit for purpose enabling them to adequately fulfil their emergency worker roles. It should meet the requirements specified in Section 2 of HSWA so that the provision of such information, instruction, training and supervision is what is necessary to ensure, so far as is reasonably practicable, the health and safety at work of the employees. Employers should also provide periodic refresher training and training for newly identified employees who may be subject to emergency exposures. 482 Information, instruction and training provided for the purposes of regulation 18 is in addition to that provided for those employees who are affected by emergency plans (see guidance to regulation 10(7) paragraphs 277-286). 483 The responsibility for provision of information, instruction and training rests with the employer of the employees concerned. The information and training for emergency workers included in emergency plans should be proportionate to the role they fulfil. The training requirements for those involved in direct intervention close to any source of radiation during an emergency are intended to be significant, detailed and continuing. Other training may be on-the-day briefing, orally or via some prepared written information. The duty lies with the emergency services or other responding organisation to provide training for its own employees. However, operators should be able to help with this (see also regulation 15(3)), and there are benefits from co-ordinating the training of employees that work at the premises with those of the emergency responders.
Regulation 18(1)(c)	*(c) provide such equipment as is necessary to restrict the exposure of such employees to ionising radiation;*
Guidance 18(1)(c)	484 Emergency workers may need equipment to enable them to deal with the incident but which will also enable them to restrict their exposure to ionising radiation. Remote handling tools may be necessary to manipulate sources or to manoeuvre apparatus in high external radiation fields. Employees may need to wear personal protective equipment such as respiratory protection to enable them to enter and work in areas containing high levels of airborne radioactive contaminants. Electronic personal alarm dose meters or dose-rate monitoring instruments, suitable for the types of radiation and dose rates likely to be encountered, should also be provided. In the event of a release of radioactive iodine, doses received by emergency workers can be restricted by administration of stable iodine tablets.

	485 Equipment provided for the purposes of regulation 18 is in addition to that provided for those employees as per regulation 10(7) paragraphs 284-286. Arrangements for the issue of equipment for employees likely to receive emergency exposures should be described in emergency plans. 486 Emergency services and other responding organisations may need advice on the suitability of personal protective equipment to be worn by emergency workers. They are advised to discuss this with the operator in the first instance when they are developing their emergency plans. 487 Preventative and protective equipment should reflect the risks in the role being undertaken. The operator may also need to provide responding organisations with specialist equipment that is particular to a plant or emergency event where it would not be reasonable for those organisations to hold or bring along such equipment (for example, to provide alternative communication systems if usual systems do not function in particular facilities).
Regulation 18(1)(d)	*(d) make arrangements for medical surveillance by an appointed doctor or employment medical advisor to be carried out without delay in the event of a radiation emergency in respect of those employees who receive emergency exposures;*
Guidance 18(1)(d)	488 Arrangements for medical surveillance need to be made in advance to ensure there are no unreasonable delays in providing it. However, the medical examination need not take place until an emergency exposure has been received (although some classified emergency workers on the premises may have already received medical surveillance under regulation 25 of the 2017 Regulations). Medical surveillance should be carried out by appointed doctors or employment medical advisers, and should include special medical surveillance of any emergency worker who has received an emergency exposure. The nature of the medical surveillance for each individual should take account of the nature of the emergency exposure and that individual's state of health. Any individual should undergo a special medical examination (which may involve counselling the individual and detailing possible restrictions on further exposure)when: (a) they have received an effective dose of ionising radiation in excess of 100 milliSieverts in a year; (b) they have received an equivalent dose of at least twice any relevant dose limit specified in the 2017 Regulations; or (c) if the appointed doctor (or employment medical adviser) considers this to be necessary in the circumstances. 489 Regulation 25(2) of the 2017 Regulations requires that employers arrange for health records to be kept in respect of employees who are subject to medical surveillance. Such records are not essential for non-classified persons who receive emergency exposures, but employers may find it is useful to keep a record of the medical surveillance that has been conducted using a health record. Such a health record would normally be kept until the person to whom it relates has or would have attained the age of 75 years, but in any event not less than 30 years from when the record was made. Confidential clinical information should not be recorded in the health record. Note that the Data Protection Act 2018 [35] contains data protection requirements relevant to any such health records, including the right of data subjects to see their health records.
Regulation 18(1)(e)	*(e) make arrangements with an approved dosimetry service for—* *(i) dose assessments to be carried out without delay in the event of a radiation emergency in respect of those employees who receive emergency exposures, and a dose assessment made for the purpose of this sub-paragraph shall, where practicable, be made separately from any other dose assessment relating to*

	those employees; and *(ii) the results of the dose assessments carried out under sub-paragraph (i) to be notified without delay to the employer and to the regulator;*
Guidance 18(1)(e)	490 Employees who may receive emergency exposures, and who are routinely involved in work with ionising radiation and are classified persons under the 2017 Regulations, will already have arrangements for dose assessments and medical surveillance made for them by their employers. These are likely to be employees of the operator. Consideration should be given to providing additional dosemeters to these employees (assuming that there is sufficient time to do this) when a radiation emergency is declared, so that doses received while they are undertaking tasks as emergency workers may be assessed separately from routine doses and be recorded separately in the dose record. Employers should be aware that in an emergency, there may be significant exposure from routes not covered by the arrangements for routine dosimetry. For example, classified persons may be monitored routinely for exposure only to external radiation, whereas during an emergency exposure they may also receive exposure to internal radiation. In such cases the employer should make suitable arrangements with appropriate approved dosimetry service(s) in addition to the one(s) used for the routine dosimetry. 491 There may be others who may receive emergency exposures but who do not routinely have dose assessments or medical surveillance. For a radiation emergency this may include: (a) employees who would only be exposed to ionising radiation during a radiation emergency, such as company firefighters; (b) employees of contractors on the premises; (c) employees of the emergency services; (d) employees of other emergency responders such as care assistants for those living in an affected area or bus drivers involved in evacuation of employees; and (e) volunteers as per regulation 18(11). 492 It may not be necessary or reasonable to provide all these emergency responders with dosemeters routinely for use in case of a radiation emergency. Nevertheless, arrangements should be made to ensure that dose assessments can be made with an approved dosimetry service during a radiation emergency, with follow-up medical surveillance as necessary. For example, the operator may arrange to have a supply of dosemeters that can be distributed to such emergency workers during a radiation emergency. 493 Arrangements for the issue of dosemeters should be described in emergency plans. Arrangements for dose assessments should be made with an approved dosimetry service, and arrangements need to be in place for the service to notify immediately the results of those assessments to the employer and regulator.
Regulation 18(1)(f)	*(f) make arrangements, in respect of dose assessments to be carried out and notified pursuant to sub-paragraph (e), to notify the results of such assessments without delay to the appointed doctor or employment medical adviser who is carrying out the medical surveillance on the employee to whom the assessment relates; and*
Guidance 18(1)(f)	494 Arrangements should be in place to forward the dose assessments to the approved doctor or employment medical adviser who will be carrying out the medical surveillance.

Regulation 18(1)(g)	*(g) identify those employees who are authorised, in the event of a radiation emergency, to permit any employee referred to in sub-paragraph (a) to be subject to an emergency exposure and provide employees who are so authorised with appropriate training.*
Guidance 18(1)(g)	495 When a radiation emergency occurs, there should be a person in authority who can permit employees to receive emergency exposures: (a) for the operator and any contractors on the premises - this is likely to be someone in a senior position within their own company who is available on the premises at the time of the radiation emergency; (b) for the emergency services and other emergency responders - this is likely to be the person in charge, and decisions should be taken in consultation with the authorised person for the operator. 496 It is important to note that people authorised to permit emergency exposures should themselves be employed by the employer concerned. It follows, for example, that contractors and the emergency services should authorise one of their own employees for this function, and cannot rely on someone employed by the operator. 497 The training provided for people authorised to permit employees to receive emergency exposures is separate from (although related to) the training provided for employees who may receive emergency exposures. The training for authorisations needs to include a good understanding of the effects of high doses of ionising radiation and the risk this entails of deterministic effects (where the severity of the effect is related to the radiation dose, e.g. skin burns). Such people need to be clear as to the applicable restrictions applying to employees who receive emergency exposures (regulation 18(5) and 18(6)). The training needs to stress the importance of keeping a careful watch on the exposure rate and of keeping to the established dose levels for emergency exposures (see regulation 18(6)(c)) except where the conditions in regulation 18(8) apply. 498 It is recognised that the person authorised to permit emergency exposures may not be located close to the incident. It is likely that the management of the exposure may have to be delegated to a person close to the incident (e.g. forward control point). This person would also need to be suitably trained and experienced to undertake this delegated role.
Regulation 18(2)	*(2) Each employer must notify the regulator of the dose levels which that employer has determined are appropriate to be applied in respect of an employee identified for the purposes of paragraph (1)(a) in the event of an emergency.*
Guidance 18(2)	499 To set these dose levels, operators need to estimate the magnitude of likely doses for employees in relevant roles. The dose levels which are determined should normally be set at the maximum of such estimates. However, if the resulting dose levels are greater than the reference levels specified in regulation 20, then the emergency plan should be reviewed to reduce doses below these levels. 500 The operator should evaluate the dose levels of the emergency exposures that employees may receive to put into effect the operator's emergency plan. The operator should advise the employers of contractors, emergency services and other emergency responders on relevant dose levels where necessary or requested. 501 When setting these dose levels, the operator should take into account reference levels specified in regulation 20(1) and 20(7). 502 Dose levels should be notified to the regulator before work with ionising radiation commences. 503 Dose levels for all emergency workers, or where appropriate groups of emergency workers, (including employees that work at the premises, emergency services with roles

	at the premises, and emergency workers with off-site roles) should be notified to the regulator by the relevant employer. The requirements for emergency plans to cover arrangements for emergency exposures (see Schedule 6) and for consultation on emergency plans (see regulations 10, 11 and 15) together provide the framework for discussions between the operator and the employers of all emergency workers regarding emergency exposures. 504 The values chosen for these dose levels should make allowance for such personal protective equipment as is provided for use in the event of a radiation emergency (see regulation 18(1)(c)). For example, if emergency workers wear breathing apparatus, which provides uncontaminated air from an independent source, it may safely be assumed that there will be no inhalation of radioactive material during the intervention, and hence the internal dose from this exposure route may be disregarded. With other types of respiratory protective equipment, however, it may not be safe to assume there will be no inhalation of radioactive substances. In such cases, an appropriate protection factor should be used. 505 Additional guidance on doses for emergency exposures is contained in Public Health Protection in Radiation Emergencies, PHE [27].
Regulation 18(3)-(4)	*(3)The notification required by paragraph (2) must be made in advance of the first occasion on which the operator of the premises in which the employee works undertakes work with ionising radiation to which these Regulations apply.* *(4) Where an employer determines that a dose level notified under paragraph (2) is no longer appropriate to be applied in respect of an employee identified for the purposes of paragraph (1)(a) in the event of such emergency, and that a revised dose level should be determined, the employer must, at least 28 days before formally determining the revised dose level, or within such shorter time as the regulator agrees, notify the regulator of the revised dose level which the employer considers is appropriate to be applied.*
Guidance 18(4)	506 Regulation 18(4) provides for dose levels for emergency exposures to be revised if the need arises, perhaps resulting from a material change in the nature of the work undertaken, or a change to the response set out in the emergency plan by way of new techniques or new equipment for example.
Regulation 18(5)	*(5) In any case where, in the opinion of the regulator, the dose levels for exposure notified pursuant to paragraph (2) or (4) are too high, the employer must, if directed to do so by the regulator, substitute such other dose level or levels as the regulator considers appropriate.*
Guidance 18(5)	507 The regulator may decide that the dose levels for the emergency exposures are too high in relation to the likely benefits to be gained. In such cases, the regulator may require these dose levels to be changed. This may have a subsequent effect on the emergency plan, and require the procedures in the plan to be modified so that mitigation is still effective but emergency workers are exposed to lower doses of ionising radiation.
Regulation 18(6)	*(6) Where an emergency plan is put into effect pursuant to regulation 17, each employer must ensure—* *(a) that no employee of that employer who is under 18 years of age, no trainee or apprentice under the age of 18 years of age, and no female employee who is pregnant or breastfeeding is subject to an emergency exposure;* *(b) that no other employee of that employer is subject to an emergency exposure*

	unless— *(i) that employee has agreed to undergo such exposure;* *(ii) the requirements of paragraph (1)(a) to (f) have been complied with in respect of that employee; and* *(iii) that employee has been permitted to be so by an employee authorised for that purpose under paragraph (1)(g); and* *(c) that the protective action taken in response to that radiation emergency prioritises keeping the dose level below the dose level determined in accordance with paragraphs (2), (4) or (5).*
Guidance 18(6)	508 In the event of a radiation emergency, and when an emergency plan is being implemented in accordance with regulation 17, each employer should put into effect all the arrangements that have been made in respect of emergency exposures for their employees. In particular, and except in circumstances described in regulation 18(8), no employee should be exposed to a dose of ionising radiation greater than the effective emergency exposure dose level notified to and agreed with the regulator. 509 Those employees who have been authorised to permit other employees to receive emergency exposures will need to begin by reviewing the employees who are available to act as emergency workers, and those available employees will need to agree to receive an emergency exposure (although prior agreement may have been reached during the planning stages). Anyone under 18 years of age, or a female employee who is knowingly pregnant or breastfeeding, must first be excluded. Then any other employees considered to be unsuitable (see the guidance to regulation 18(1)(a))should also be excluded. 510 The exclusion of employees who have been involved in the incident which led to the radiation emergency should be considered. Individuals injured or otherwise incapacitated will not be suitable. Individuals who may have been overexposed to ionising radiation (having likely doses greater than the dose limits in the 2017 Regulations) may also be unsuitable, unless it can be confirmed by personal dosimetry that the doses received in the radiation emergency do not approach the dose levels for emergency exposures. If any such individuals are permitted to receive emergency exposures, the doses received in the emergency should be added to the emergency exposure for comparison with the dose levels established under regulations 18(2), (3) or (5).
Regulation 18(7)	*(7) The requirement imposed on the employer by paragraph (6)(a) in respect of a female employee who is pregnant or breastfeeding does not apply until that employee has notified the employer in writing of that fact or the employer ought reasonably to have been aware of that fact.*
Guidance 18(7)	511 Prevention of pregnant or breastfeeding employees from receiving emergency exposures depends on the employee informing the employer of her condition. Regulation 15 of the 2017 Regulations requires employers of female employees to ensure that they are informed about the possible risks and the importance of informing the employer in writing as soon as they are aware of their pregnancy. This is particularly important where a female employee has been identified under regulation 18(1)(a) of REPPIR as someone who may be subject to emergency exposures.
Regulation 18(8)	*(8) The requirement imposed by paragraph (6)(c) does not apply in respect of an exposure of any employee who—* *(a) having been informed about the risks involved in the implementation of an emergency plan, agrees to undergo an exposure greater than any dose level referred to in that sub-paragraph in order to save life, prevent severe health effects induced by ionising radiation, or to prevent the development of catastrophic*

	conditions; and *(b) is permitted to undergo such exposure by an employee authorised by the employer in accordance with paragraph (1)(g) to give such permission.*
Guidance 18(8)	512 During a radiation emergency, events may not coincide with earlier predictions. In particular, people may be in in danger of death, and the only way to save their life would be for them to be rescued by emergency workers. In saving these people, the emergency workers may be in a situation where they would receive doses of ionising radiation in excess of the dose levels identified in the emergency plan for emergency exposures including doses in excess of reference levels. In such circumstances, emergency workers who agree to receive doses in excess of these dose levels may be permitted to do so by an employee authorised to permit emergency exposures. Emergency workers should only be permitted to receive doses in excess of the dose levels for emergency exposures when the benefits to others outweigh the risks they will incur. Arrangements to manage and control such decision making processes should be included within the emergency plan. Radiation protection advice would be particularly valuable in decision making, and the operator should provide information on the radiological conditions and hazards to inform such a decision. 513 The employer should consider making a record signed by the employees agreeing to receive, and by the employers permitting them to receive, doses above the dose levels confirming that the individuals concerned were informed about the risks involved in the intervention before agreeing to undergo such emergency exposures. They should also include the circumstances that justified such exposures in terms of saving human life. If this record is not made prior to the exposure, it should be made as soon as possible after the event.
Regulation 18(9)	*(9) Where an employee has undergone an emergency exposure, the employer must ensure that the dose of ionising radiation received by that employee is assessed by an approved dosimetry service and that the dose assessed is recorded separately in the dose record of that employee or, where no dose record exists, in a record created for the purpose of this paragraph complying with the requirements to which it would be subject if it were a dose record.*
Guidance 18(9)	514 Any employee who receives an emergency exposure must have that dose recorded in their dose record. 515 If an employee received an emergency exposure when routine dosimetry was being worn, an estimate of the emergency exposure received should be made and this should be recorded separately in the employees dose record. Prior to any intervention which would be expected to result in emergency exposures, an emergency dosemeter should replace any routine dosimetry worn. 516 Arrangements with an approved dosimetry service must be made under 18(1)(e). If an employee receives an emergency exposure, and that employee does not normally work with ionising radiation and therefore has no dose record under the 2017 Regulations, then their employer must create a dose record for them. The employer should make arrangements with an approved dosimetry service to make and keep this dose record.
Regulation 18(10)	*(9) An employer must, at the request of that employer's employee in circumstances where a record has been created for the purpose of paragraph (9) and on reasonable notice being given, obtain from the approved dosimetry service and make available to the employee a copy of the record of dose relating to that employee.*

Guidance 18(10)	517 This provision allows employees to obtain personal dose monitoring information from the employer, and extends to emergency workers the right of classified persons and others under the 2017 Regulations to be made aware of such information.
Regulation 18(11)	*(11) In the event of a report being made pursuant to regulation 17(6) relating to the circumstances of an emergency exposure and the action taken as a result of that exposure, an employer shall keep such a report (or copy of the report)* *(a) until any person to whom the report relates has or would have attained the age of 75 years; and* *(b) in any event, for at least 30 years from the termination of the work which gave rise to the emergency exposure.*
Guidance 18(11)	518 Following a radiation emergency, the operator is required to make a full report of the consequences of the emergency. This should include the emergency exposures, medical surveillance and treatment received by emergency workers. Any information relating to emergency exposures, medical surveillance or treatment should be kept for the same period of time as the dose records of those employees.
Regulation 18(12)	*(12) An employer who has a duty under this regulation must also comply with that duty as regards any person who regularly provides a service to that employer as a volunteer.*
Guidance 18(12)	519 Volunteers may include individual members of organisations such as the British Red Cross, Police Special Constabulary, HM Coastguard or St John's Ambulance who volunteer to carry out certain tasks in an emergency. Volunteers should be identified in the emergency plan by name or role. These volunteers should be considered as employees of the voluntary organisation for the purposes of these Regulations. Voluntary organisations will be under the direction of an emergency responder who accepts liability. 520 A volunteer should be provided with the same protection as employees who perform the same type of activity and all the requirements identified in this regulation apply. The information and training provided should be proportionate to the role being undertaken. 521 There may also be members of the public who present themselves on the day to help in the emergency. These "spontaneous workers" are not authorised to receive emergency exposures and the provisions of the 2017 Regulations apply. Anyone ignoring advice provided by those in authority not to enter areas restricted during an emergency are also not considered to be emergency workers.

Regulation 19 Disapplication of dose limits

Regulation 19(1)	*(1) Except in relation to a perceived risk arising from a radiation emergency, regulation 12 of the 2017 Regulations does not apply to an emergency worker, where that emergency worker—* *(a) is engaged in preventing the imminent occurrence of a radiation emergency; or* *(b) is acting to mitigate the consequences of a radiation emergency which it is expected will occur or which has occurred.*

Guidance 19(1)	522 Regulation 19 provides for the disapplication of dose limits where necessary to respond to a radiation emergency or prevent the occurrence of a radiation emergency. 523 A procedure for disapplying dose limits should be written into emergency plans. The procedure should enable the person(s) making the judgement to be identified by role and state how they will be advised and whom they should inform. The person(s) will be a post holder identified by their role or job title and will be suitably trained to undertake the required tasks as required by regulation 18(1). 524 If a radiation emergency occurs or an event occurs which could lead to a radiation emergency, emergency plans would be implemented (regulations 17(1)), and emergency exposures for emergency workers may be authorised (regulation 18) to prevent the emergency from escalating. 525 Emergency workers who have been authorised to receive emergency exposures may be exposed to doses in excess of the dose limits specified in the 2017 Regulations (regulation 12, Schedule 3, Part I, paragraphs 1 and 2). 526 This regulation applies when a radiation emergency will happen or is likely to happen if standard or emergency operating procedures fail to prevent the radiation emergency from occurring. It will not be appropriate for this regulation to be applied where the action necessary to respond to or prevent a radiation emergency can be done in such a way that restricts exposures to normal dose limits. This regulation applies only in relation to radiation emergencies. Events which could not lead to a radiation emergency are not covered by these Regulations. 527 Dose limits would still apply to emergency workers who have not been authorised to receive emergency exposures, other people located at the premises and members of the public. **Re-application of dose limits** 528 Once help has been provided to endangered persons, exposure has been prevented to other persons and/or valuable installation or goods have been saved, emergency exposures cannot be applied and the 2017 Regulations dose limits will again apply. Every effort should be made to re-apply the dose limits in the 2017 Regulations in a timely manner (see principles and purposes of emergency plans in Schedule 7).

Regulation 20 Reference levels

Regulation 20(1)-20(2)	*(1) The operator or local authority which has prepared an emergency plan in accordance with regulations 10 or 11, as the case may be, must ensure that the emergency plan prioritises keeping effective doses below a 100 mSv reference level.* *(2) The operator or local authority must record in the emergency plan for which it is responsible the appropriate dose level for each emergency worker as determined by the employer in accordance with regulation 18(2).*
ACOP 20(1)-20(2)	**529 Operators and Local Authorities should determine reference levels for persons or groups of persons that may be affected by the radiation emergency and/ or for those persons with specific roles in responding to a radiation emergency.** **530 Reference levels should relate to the total residual effective dose (the dose expected to be incurred by an individual after protective action has been implemented) estimated to be received both during the emergency (acute) and, for**

	members of the public, over the first year following the emergency (annual). **531 Reference levels for members of the public should include doses from the longer term exposure pathways of ingestion, resuspension and external irradiation (from deposited gamma-emitting radionuclides).**
Guidance 20(1)-20(2)	532 Notwithstanding the overriding principle of restriction of radiation exposures to as low as reasonably practicable, regulation 20 provides that the operator's emergency plans and the local authority's off-site emergency plans must prioritise reducing doses to all persons below an effective dose of 100 mSv. These persons include employees of the operator (such as all employees on the premises and identified emergency workers employed by them), other emergency workers, and members of the public. 533 In exceptional circumstances, such as saving life, the reference level for emergency workers may be up to an effective dose of 500 mSv. 534 Reference levels are: a) an emergency planning tool aimed at achieving an optimised response over all relevant exposure pathways and protective actions; b) an indicator of the level of exposure considered as tolerable, given the prevailing circumstances; and c) values to inform decisions on protective action and support the practical implementation of the optimisation principle when the response to an emergency is underway. 535 Operators should describe in their emergency plan the lowest appropriate reference levels for groups or categories of emergency workers who have a role in the operator's emergency plan and for other employees on the premises. 536 Local authorities should describe in the off-site emergency plan the lowest appropriate reference levels relevant to potential radiation emergencies at the premises for groups or categories of emergency workers who have a role in the off-site plan and for members of the public. For emergency workers in the off-site plan, such as the emergency services, local authorities will obtain this information from the employers of these workers who have determined relevant levels in accordance with regulation 18(2). For members of the public, local authorities should take advice from PHE. 537 For emergency workers, the values chosen should be chosen in consideration of the doses likely to be incurred during the event or tasks expected to be undertaken in the appropriate plan. Employers should seek advice from an RPA in identifying these levels. 538 No emergency arrangements should plan for exposures in excess of the identified relevant reference level. Although, reference levels are not a dose limit, and, in the event of a severe emergency it may be appropriate for them to be adjusted or exceeded. Further detail regarding the purpose and use of reference levels can be found in Public Health England's publication entitled "Public Health Protection in Radiation Emergencies". [27] 539 Reference levels must be recorded in emergency plans, and notified to the regulator under regulation 18(2). Providing the record relates to all emergency workers in the emergency plan, these may be identified by relevant groups or categories of emergency workers as appropriate.
Regulation 20(3)	*(3) Where the response to a radiation emergency is underway, reference levels determined for emergency workers in accordance with regulation 18(2) may be revised or introduced in relation to specific tasks by that emergency worker's employer in order to optimise the response.*

Guidance 20(3)	540 Where possible, employers should seek advice from an RPA in identifying these levels.
Regulation 20(4)-20(7)	*(4) In exceptional circumstances, in order to save life, to prevent severe radiation-induced health effects or to prevent the development of catastrophic conditions, a reference level for an effective dose for an emergency worker from external ionising radiation may be set by an employer in excess of 100 mSv but not exceeding 500 mSv.* *(5) Where the response to a radiation emergency is underway, specific reference levels, to optimise the response, may be determined by the local authority in whose area an off-site emergency plan is in place.* *(6) In determining specific reference levels under paragraph (5), the local authority must take advice from the person coordinating the off-site response to the radiation emergency.* *(7) The Secretary of State may also set a reference level whether applicable locally or nationally in addition to any reference level set under paragraph (5).*
Guidance 20(4)-20(7)	541 During a radiation emergency and in a transition to an existing exposure situation, emergency response plans are adapted to the specific emergency taking place and reference levels may need to be developed accordingly. This may involve adjustment of previously identified reference levels relevant to the circumstances, the setting of additional reference levels for specific tasks or groups of persons, and consideration of other legislation applicable to existing exposure situations (Ionising Radiation (Misc. Provisions) Regulations 2018) [36]. Any adjustment of reference levels during an emergency would not normally be required until after the initial response phase to allow the operator and other responding organisations to carry out their roles in the emergency plans. 542 In determining reference levels, the local authority must take advice from the person coordinating the off-site response to that emergency. This person is usually the Chair of the Strategic Coordinating Group (SCG) at the Strategic Coordinating Centre (SCC) who will, in consultation with radiation protection and emergency response experts such as the Scientific and Technical Advice Cell (STAC), advise the local authority as appropriate. 543 For members of the public, reference levels may relate to specific groups of people or geographical locations. In these circumstances, optimisation of the response will be in relation to doses likely to be incurred during and over 12 months following start of the emergency. These reference levels will assist local authorities in considering options for recovery planning, and those recovery options which could be put in place over the first year to reduce doses.
Regulation 20(8)	*(8) Any revision of the reference levels in response to a radiation emergency made in accordance with paragraph (3), (4), (5) or (7) must be recorded in the report required by regulation 17(6).*

Regulation 21 Prior information to the public

Guidance 21	544 The purpose of this regulation is to ensure the population in detailed emergency planning zones are appropriately informed and prepared in the unlikely event of a radiation emergency and that members of the public in the outline planning zone have access to information should they require it. The understanding and co-operation of those affected should enhance the effectiveness of the protective action. In an emergency members of the public may receive or be directed to information from a variety of sources. Providing prior information should help to ensure that the public are aware of the official sources of information which in turn should help to reduce the likelihood of members of the public taking unwarranted action. 545 Greater dialogue with the local community is aimed at increasing the effectiveness of messages given to those who could be affected. While hard copy and electronic information must always form part of the communication strategy, it does not preclude the parallel use of other means of communicating and compliance with this regulation could form part of a broader strategy of communication with the local community. This could include some combination of advertising in the local media, forming local forums, organising exhibitions, holding public meetings and arranging visits to, and open days at the premises. The local authority and operator should cooperate with one another when planning a public communication strategy.
Regulation 21(1)-21(3)	*(1) The local authority which has responsibility for an area covered by an off-site emergency plan with a detailed emergency planning zone must, in cooperation with the operator, ensure that members of the public are made aware of the relevant information, and, where appropriate, are provided with it.* *(2) The local authority which has responsibility for an area covered by an off-site emergency plan with an outline emergency planning zone must, in cooperation with the operator, ensure that members of the public have access to the relevant information.* *(3) The relevant information referred to in paragraphs (1) and (2) is—* *(a) where the area is covered by a detailed emergency planning zone only, the information set out in Part 1 of Schedule 8 only;* *(b) where the area is covered by an outline planning zone and a detailed emergency planning zone, the information set out in paragraphs 8 and 9 of Schedule 8 in addition to the information set out in Part 1 of Schedule 8;* *(c) where the area is covered by an outline planning zone only, the information set out in Part 2 of Schedule 8.*
ACOP 21(1)-21(3)	**546 Prior information should be supplied in an appropriate manner and in an accessible format to members of the public who are in the detailed emergency planning zone, without their having to request it, so far as reasonably practicable.** **547 Prior information should be available in an appropriate manner and in an accessible format to members of the public in the outline planning zone. If members of the public request such information they should be directed to it or provided with access to a hard copy if requested.**
Guidance 21(1)-21(3)	548 Once the detailed emergency planning zone and / or outline planning zone have been determined, the local authority is responsible (in cooperation with the operator) for ensuring that prior information is provided / made accessible in an appropriate manner in those areas. The information must cover at least the items specified in the relevant part(s)

	of Schedule 8 (see guidance to Schedule 8). Prior information needs differ between members of the public in the different zones. In the detailed emergency planning zone, the co-operation of members of the public in planned urgent protective action is necessary in the event of a radiation emergency. In the outline planning zone, members of the public are less likely to be affected directly by urgent protective action but some may still want prior information and updates (see ACOP paragraph 547). 549 The local authority should identify members of the public who may require alternative forms of information. For example, if there is a school for the visually impaired in the planning zone, braille or audio tapes may be prepared for visually impaired members of the public. The importance of the effective communication of information to children as well as adults should be borne in mind, for example using educational packages in schools and colleges and through the use of videos. The local authority should also identify areas containing a significant community whose main language is not English, in which case the information should be translated. The different communication needs of the population should be taken into account as far as is reasonably practicable. 550 Further guidance on considerations for prior information is available in Schedule 8. **Detailed Emergency Planning Zone** 551 In the detailed emergency planning zone the information should be proactively provided to members of the public without them having to ask for it. This also applies to pockets of detailed planning in the outline planning zone (see paragraphs 762-764 for further guidance). The most common method is to produce booklets for distribution to individual households. It has to be recognised that in an emergency some people may not find their information booklets quickly and these are often reinforced with summarised safety instructions in publications that tend to be easily accessible in the home, such as a calendar or durable card. 552 All the required information does not have to be distributed as a single document. Although, there are benefits in keeping the information together which should be considered. While most of the items of information listed in Schedule 8 are related to the emergency circumstances, so will depend on the potential radiation emergencies which have been identified, paragraph 1 concerns basic facts about radioactivity and its effects on people and on the environment. For this local authorities could, if they wish, use a standard booklet produced by another organisation, as long as it is clear, concise, accurate and appropriate for this application. If separate documents are used in this way, they should still be distributed together. 553 The information should also be made available to members of the public electronically. The local authority should decide how this is to be achieved but could, for example, make the information available on its website and provide a link to it in the hard copy version of the prior information. The link could also be provided on the websites of the operator and other responding organisations. 554 Special arrangements may be needed for commercial, industrial and public authority premises, shops, hotels, multi-occupied dwellings, campsites etc. and options include displaying information in these locations. Regular visitors to the area, such as those making milk and postal deliveries, also need to be considered. Such regular visitors are probably best informed through the base from which they work (for example milk depot, sorting office) which may not be situated within the detailed emergency planning zone. The needs of regular visitors to the area should be taken into account so far as is reasonably practicable. Associated local publicity at the time of distribution may help to highlight any shortcomings in the arrangements for other identifiable transient populations. 555 Where the detailed emergency planning zone covers more than one local authority, the lead local authority may wish to make arrangements with the other local authorities to

	assist in the dissemination of prior information. 556 Where a premises is also subject to regulation 18 of COMAH (Provision of information to persons likely to be affected by a major accident at an upper tier establishment), it would normally be sensible to present the information about chemical and radiation hazards together and the local authority can coordinate this. Where members of the public are located in more than one detailed emergency planning zone, the local authority should consider the benefits of providing a single set of information covering all relevant premises. **Outline Planning Zone** 557 In the outline planning zone prior information should be available to members of the public if they request such information. It does not need to be distributed to members of the public as in the case of the detailed emergency planning zone. The appropriate information must be available electronically, for example on the local authority website, and there should be arrangements in place to direct members of the public in the outline planning zone to this information if it is requested by them and to provide access to a hard copy if requested. Links to the information could be also be added to the websites of the operator and other responding organisations. Where multiple outline planning zones overlap, the local authority should consider the benefits of producing a single set of information covering all relevant premises.
Regulation 21(4)	*(4) In preparing the information to be provided in accordance with paragraphs (1) and (2), the local authority must consult such persons who seem to that local authority to be appropriate.*
ACOP 21(4)	**558 In preparing the prior information the local authority should consult the operator, each local authority in the detailed emergency planning zone and / or outline planning zone and any authorities named in the prior information, in addition to any other persons the local authority considers appropriate.**
Guidance 21(4)	559 The local authority, operator and responding organisations should work together when developing and publishing public information. Since local authorities have the duty to supply the information to the public, they also have the final responsibility for its accuracy, completeness and form; cooperation and consultation will help to achieve this. 560 In communicating with members of the public, consultation with other tiers of local authority will help to ensure the best use of local knowledge and expertise. 561 The local authority would normally need to consult the emergency services; health authority/board for the area where the premises are situated, certain government departments and agencies. 562 The local authority could consult with representative groups of people for whom the prior information is intended, for example a local forum. This is to ensure the information will be easily understood by members of the public.
Regulation 21(5)-21(6)	*(5) The information to which members of the public are to be provided or to have access in accordance with paragraphs (1) and (2) must be made available to them both electronically and in hard copy.* *(6) The local authority must review, and where necessary revise, the relevant information referred to in paragraph (3)—* *(a) at regular intervals, but in any case not exceeding three years; and* *(b) whenever significant changes to the protective action or authorities referred to in paragraphs 3, 4 and 5 of Schedule 8 take place.*

Guidance 21(5)-21(6)	563 Changes that would be considered significant in accordance with regulation 21(6)(b) relate to: (a) major variations in the activities that can give rise to a radiation emergency (the local authority would be informed of such changes by the operator in the consequences report under regulation 7); (b) the system of warning of a radiation emergency; (c) the means by which people can continue to keep themselves informed during a radiation emergency; (d) the protective action; (e) the system of distribution of stable iodine tablets; (f) the evacuation arrangements; (g) the responding organisations; and (h) other important features of the emergency plans which will have a practical impact on the population likely to be affected. 564 The local authority should also review and revise the information when the boundary of the detailed emergency zone is re-determined or there is a change in the extent of the outline planning zone. 565 The local authority, operator and responding organisations should co-operate on the revision of the information and the local authority should consult on the changes with the appropriate persons.
Regulation 21(7)	*(7) Where the information has been revised in accordance with paragraph (6) the local authority must ensure that the revised information is made available to members of the public who have property in or who are in the area covered by the local authority, in accordance with paragraph (1) or (2) as appropriate.*
Guidance 21(7)	566 Where the information has been revised in accordance with regulation 21(6) the information must be resupplied to members of the public in the detailed emergency planning zone and information made available to members of the public elsewhere, must be updated as appropriate. This must be done as soon as reasonably practicable after the revision (see regulation 21(9)(b)). As part of the review undertaken in accordance with regulation 21(6) the methods for supplying information and making information available in the outline planning zone may also need to be reviewed and amended as necessary. 567 Where the detailed emergency planning zone is re-determined the information should be supplied to any new members of the public within the area. Where members of the public are no longer in the detailed emergency planning zone, they should be notified of this.
Regulation 21(8)	*(8) The operator must not carry out the work with ionising radiation to which the evaluation made in accordance with regulation 4(1) or 6(1) applies before the information referred to in paragraph (3) is supplied.*
Guidance 21(8)	568 To make an adequate off-site emergency plan, ACOP paragraph 293 recommends that prior information is supplied in accordance with this regulation. Prior information should therefore be supplied / made available by the time the plan comes into effect.
Regulation 21(9)	*(9) The local authority must ensure that the information is made available in accordance with paragraph (1) or (2) again—* *(a) at intervals not exceeding three years; and* *(b) if it is revised pursuant to paragraph (6), as soon as reasonably practicable after*

	the revision.
Guidance 21(9)	569 In addition to updating and resupplying the information, either as part of the regular three-yearly review programme or following significant changes to the emergency arrangements (see regulation 21(6)), the information must be resupplied to members of the public in the detailed emergency planning zone at least every three years. 570 The reason for repeating the information at regular intervals, regardless of whether there have been significant changes in the meantime, is to cater for changes in the population likely to be affected, such as new housing or industrial developments, and as a refresher for those who have previously been informed. Three years is the maximum permitted interval, but redistributing the information more often may increase the likelihood of the key messages being remembered. The frequency of resupply of the information needs to be gauged against these factors. Local authorities may resupply prior information routinely on a more frequent basis.
Regulation 21(10)	*(10) Where a report is made pursuant to regulation 7, the local authority must make that report available to the public as soon as reasonably practicable after it has been sent to the regulator under that regulation (except that, with the approval of the regulator, the local authority must not make available any part or parts of such report for reasons of industrial, commercial or personal confidentiality, public security or national security).*
ACOP 21(10)	**571 The local authority should cooperate with the operator to identify if any information should be excluded in the publicly available consequences report.** **572 The operator should inform the local authority of any information which is to be withheld at the time of submitting the consequences report to the local authority. At the same time the operator should make a written request to the regulator to withhold such information.** **573 Where the regulator gives approval to withhold information the operator should provide the local authority with a redacted report as soon as reasonably practicable. The redacted report should be made available to the public by the local authority as soon as is reasonably practicable after receiving the redacted report.** **574 The local authority should ensure that publicly available versions of the consequences report are updated when a revised report is received in accordance with regulation 7(2)(b).**
Guidance 21(10)	575 When preparing the consequences report the operator may choose to ensure that the report, as a whole, is suitable for the public domain. Otherwise, the local authority must exclude certain parts of the consequences report if the information is industrially, commercially or personally confidential, or where public security or national security may be compromised, and should cooperate with the operator to identify such information. Information which might be withheld may include, for example, details of processes and special techniques, intellectual property and information which is not available elsewhere or is particularly valuable and information that may compromise public or national security. Independent advice on information which could compromise public or national security can be sought from the Centre for the Protection of National Infrastructure (CPNI) and/or the National Counter Terrorism Security Office (NaCTSO); and the Office for Nuclear Regulation where it concerns a civil nuclear site. 576 It may be appropriate to provide a summary of the report in plain language and the local authority should liaise with the operator to prepare this. 577 It is for the local authority to determine the best mechanism for making reports available to the public and to help members of the public locate such reports. This could

	include publishing on the internet or other relevant communication channels (including providing links on relevant stakeholder websites) and in local public libraries. 578 It is not a requirement of REPPIR for the consequences report to be given to members of the public who request it or for the report to be proactively distributed. It is sufficient that it is published in places to which the public has access and can be directed to. 579 Additionally, it is common practice for the full emergency plans of the major nuclear installations to be made available to the public on the internet or in local libraries.

Regulation 22 Duty of local authority to supply information to the public in the event of an emergency

Regulation 22	580 Regulation 22 applies to all local authorities whether or not they have REPPIR premises in their area. It relates to general duties on local authorities to have arrangements to provide information about any kind of emergency involving ionising radiation (referred to as an 'emergency' in this regulation and associated guidance) and is not limited to emergencies occurring on nuclear or radiological premises. Regulation 22 applies to transport radiation emergencies, in addition to other types of emergency not otherwise covered by the rest of these Regulations (for examples and further guidance on the definition of 'emergency' see regulation 22(6)). Other requirements for transport radiation emergencies, including prior information, are included in CDG. 581 The context of this regulation is planning for situations where an emergency has already occurred, including radiation emergencies as defined in these Regulations based on perceived risk. Such planning is easier for premises of known hazard potential, but will be more difficult for events of unpredictable location and nature, such as transport radiation emergencies, a fallen nuclear powered satellite, or radioactive contamination being present in a public area. 582 The purpose of this regulation is to ensure that those members of the public actually affected by an emergency are informed promptly of the facts of the emergency and of any protective action they should take. For this reason the arrangements should be adaptable dependant on the nature and extent of the emergency. 583 This regulation is for the benefit of those on whom the protective action may have a direct impact. It is not concerned with informing the wider public, important though prompt and accurate reporting would be in such circumstances.
Regulation 22(1)	*(1) Every local authority must prepare and keep up to date arrangements to supply, in the event of an emergency in that local authority's area (however that emergency may arise), information about and advice on the facts of the emergency, of the steps to be taken and, as appropriate, of the protective action applicable.*
Guidance 22(1)	584 Every local authority must make and keep up to date arrangements to supply information and advice to the public in the event of an emergency affecting members of the public in its area. This duty applies to all local authorities, regardless of whether there is a REPPIR premises in their area. It is intended to reinforce the relationship between making arrangements to supply information and emergency planning. Where a local authority has an off-site emergency plan under these Regulations, the arrangements for supplying information to the public about radiation emergencies as defined in REPPIR should be included in the plan. Each responding organisation has its own emergency arrangements. The role of the local authority is to ensure that the arrangements for

	providing information come together in a complementary and comprehensive way to form the arrangements required by this regulation. The collective arrangements should consider how and from whom the information will be obtained. 585 There is no requirement for the local authority to prepare the information and advice themselves. For premises, the information and advice will usually be provided by other organisations, as outlined in the organisation's emergency arrangements and the off-site emergency plan, where one exists. To cope with emergencies that are unpredictable in nature, location and timing, such as transport radiation emergencies, the arrangements to inform those affected will of necessity be less detailed and more flexible. Most local authorities and other Category 1 responders already have communication arrangements in place under duties in CCA which could be used as a basis for providing the information required by this regulation. 586 The key communication objectives in an emergency response are to deliver accurate, clear and timely information and advice to members of the public aimed at helping them to keep safe and well informed. Arrangements should be sufficiently flexible and extendable to address the wider range of emergencies to which this regulation applies and to address any escalation of events. 587 Local authorities should consider how the information will be conveyed and should consider the relevant points in paragraph 784 under Schedule 8. Any pre-prepared messages should also be tested and periodically reviewed. 588 If an emergency has not occurred, but an event has occurred which could reasonably lead to an emergency, it is important to avoid creating undue alarm. Therefore, care needs to be taken when deciding what information is provided and in what format whilst ensuring openness and transparency. Members of the public should be provided with the necessary factual information to enable them to understand the situation and respond in an appropriate manner if necessary. 589 Where there is the potential for a REPPIR radiation emergency to arise based on perceived risk, the communication arrangements should aim to provide reassurance to members of the public and manage local concerns. Such arrangements should form part of the emergency plans prepared under these Regulations.
Regulation 22(2)	*(2) The arrangements prepared and kept up to date under paragraph (1) must provide for the information to be supplied at regular intervals in an appropriate manner, without delay, and without their having to request it, to members of the public who are in that local authority's area and who are actually affected by the emergency.*
Guidance 22(2)	590 The information arrangements should be directed towards those members of the public actually affected by an emergency. This group of people is more precisely defined by regulation 22(5). 591 The arrangements should ensure that, if an emergency occurs, the information is given to members of the public immediately, or, if considered necessary, before actual declaration of an emergency. The degree of detail will depend on the circumstances at the time. There could be some situations where an event has occurred and where a release of radioactivity is anticipated but has not yet occurred. This may allow time for greater breadth and depth of information to be supplied. In situations where speed of action is paramount or where there is a lack of information the initial alert may be restricted to a very basic message. As the emergency unfolds, more detail can be provided. The arrangements should ensure that information continues to be supplied in a way that is regular, appropriate, timely and unprompted. 592 Information may be supplied by the local authority or other organisations. The arrangements for supplying information should adopt an integrated approach to

	communicating with members of the public to ensure consistent messaging. 593 For premises with off-site emergency plans, arrangements may already exist with local media and other communication organisations to disseminate information and these may have been specified in the prior information and the off-site emergency plan and be part of the implementation arrangements of regulation 17. For other emergencies, a more generic approach may be required so information can be relayed promptly and those affected can be told where to access information. 594 The methods available to deliver urgent information to members of the public are extremely varied and some will depend on the availability of power supplies or phone lines. Using a range of public communication channels should maximise the success of the delivery of key messages. Consideration should be given to how community groups and vulnerable people will be reached, for example using any existing community resilience networks. 595 Arrangements should enable the identification of the most appropriate transmission method(s) of information, such as verbal and written, and the most appropriate communication channel(s), such as by the police, radio, television, internet or social media. Arrangements should take into account that the situation may be fast moving. Messages should be consistent but it may be appropriate to provide different information through different channels. For example, some channels may be more appropriate for the delivery of key messages which can be quickly understood such as radio, television, social media etc., whilst provision of more detailed information, to ensure openness and transparency, may be provided through other channels such as websites. 596 Further guidance on communicating with the public in an emergency is available in the Cabinet Office Guidance on Emergency Preparedness (Chapter 7: Communicating with the public) [37], Preparing Scotland, Warning and Informing Scotland [38] and NNEPRG [2].
Regulation 22(3)	*(3) In preparing those arrangements and in keeping them up to date, the local authority must consult any other authority likely to be responsible for implementing the relevant protective action referred to in Schedule 9 and such other persons as appear to it to be appropriate.*
Guidance 22(3)	597 Given the nature of the information arrangements, the consultation required by regulation 22(3) is essential to ensure that the roles played by different authorities dovetail effectively. Organisations likely to require consultation are a local authority involved in dissemination of prior information under these Regulations (if a different local authority to the local authority preparing the arrangements), any relevant operators, consignors of radioactive material, emergency services, the Agency, health authorities/boards and certain government departments. Where relevant, this could be done as part of the statutory consultation when preparing off-site emergency plans. 598 Some organisations may have responsibilities to issue advice or legal notice regarding protective action in Schedule 9 (for example water companies would consider that it is their duty to inform their customers of any restrictions on consumption of water supply). This should be considered when the local authority is setting up its arrangements and consulting on them. For example, local authorities will need to discuss this with the relevant organisation and come to a local agreement on how the advice will be supplied
Regulation 22(4)	*(4) The information and advice to be supplied in accordance with arrangements prepared and kept up to date under paragraph (1) must, if relevant to the type of emergency, include that specified in Schedule 9 and must, in any event, mention the authority or authorities responsible for implementing the relevant protective action referred to in that Schedule.*

Guidance 22(4)	599 This identifies the content of the information to be supplied as being that specified in Schedule 9, but only in so far as it is relevant to the type of emergency that has occurred. Schedule 9 is more indicative than prescriptive in nature. This contrasts with the prior information required by regulation 21, where the list in Schedule 8 is a minimum requirement. (For further guidance on the content of the information, see guidance to Schedule 9.)
Regulation 22(5)	*(5) For the purposes of paragraph (2), the members of the public referred to in that paragraph as actually affected are those whose cooperation is sought to put into effect any steps or protective action referred to in paragraph (1).*
Guidance 22(5)	600 The essential purpose of regulation 22 is to supply information to members of the public 'actually affected by an emergency'. Regulation 22(5) defines this group of people as those whose co-operation is sought in implementing the protective action. This group of people will include, for example: (a) those asked to shelter, evacuate or take stable iodine tablets; (b) those asked to refrain from eating or selling foodstuffs they have grown themselves; or (c) those with restriction on use of water supplies. 601 People living further afield who cannot obtain a particular foodstuff because of restrictions that have been imposed do not meet the definition of being actually affected. This is because the need for their co-operation to put into effect protective action does not arise. 602 For premises of known hazard potential it is possible to consider who may be affected by the emergency at the planning stage. For events of unpredictable location and nature, such as transport radiation emergencies, members of the public actually affected can only be identified at the time of the emergency, requiring greater flexibility in the arrangements for providing information.
Regulation 22(6)	*(6) In this regulation, "emergency" includes a radiation emergency, but also includes any other emergency (whether within the United Kingdom or otherwise) which does or could have the same impact as a radiation emergency in Great Britain.*
Guidance 22(6)	603 For the purposes of regulation 22 only, the term 'emergency' refers to any kind of emergency involving ionising radiation, whether or not the initiating event occurs in the United Kingdom, which could lead to exposure to ionising radiation of persons in Great Britain. This includes, for example, radiation emergencies as defined in these Regulations at premises, emergencies during the transport of radioactive material, fallen nuclear powered satellites, radioactive contamination being present in a public area, and releases of radiation from overseas nuclear power plants.

Regulation 23	**Retention of information**
Regulation 23	*Each operator and each local authority which has duties by virtue of these Regulations must retain the information they are required to prepare, in particular under regulations 4 to 12 and 17, and must produce that information if requested to do so by the regulator or the Secretary of State.*

Guidance 23	604 This requires operators and local authorities to consider how long records should be retained as part of their approach for demonstrating compliance with each of their duties under these Regulations. 605 The records retained by operators and local authorities includes records explicitly required by these Regulations (such as a written evaluation required by regulation 4, emergency plans required by regulations 10 and 11, and, for some employers, the RPA appointment required by regulation 24(2)). They should also include any other records underpinning compliance with these Regulations (such as justification that a source is non-dispersible for the purposes of regulation 3(5)). Employers have general and specific requirements to retain information in other legislation such as Health and Safety at Work Act etc. and the 2017 Regulations. For example retention of employee training records and records of examination for personal protective equipment. 606 Dutyholders should ensure that adequate paper or electronic records are held for a period necessary to demonstrate compliance with these Regulations. All records must be retained for at least the period of their validity. Supporting records (e.g. references in documents or a written evaluation that may be subject to a declaration of no change under regulation 6(2)(b)) should be retained for at least the same period as their overarching record. Dutyholders should take account of other relevant legislative requirements and standards such as the Data Protection Act, the 2017 Regulations, licence conditions for nuclear licensed sites, and ISO 15489-1:2016 (Information and documentation - Records management) [39]. Regulations 17(8) and 18(11) specify minimum retention periods which must be complied with. 607 An effective records management system will assist in controlling records and demonstrating compliance to the regulator. This should include a retention schedule which details the type of records to be kept and their retention and review periods.

Regulation 24	**Radiation protection adviser**
Guidance 24	608 The requirements in regulation 24 to consult a radiation protection adviser (RPA) are additional to those in the 2017 Regulations and relate specifically to advice concerning the employer's preparations for responding to radiation emergency situations. Employers may need a range of emergency planning specialist advice in addition to the radiological protection advice provided by the RPA.
Regulation 24(1)-24(2)	*(1) Every employer which carries out work with ionising radiation must consult one or more suitable radiation protection advisers about occupational and public exposure to assist with that employer's preparations for responding to radiation emergency situations.* *(2) Where an employer consults a radiation protection adviser pursuant to the requirements of paragraph (1) (other than in respect of the observance of that paragraph), the employer must appoint that radiation protection adviser in writing and must include in that appointment the scope of the advice which the radiation protection adviser is required to give as if the employer were an employer under the 2017 Regulations.*
ACOP 24(1)-24(2)	**609 To be suitable for the purposes of these Regulations, an RPA will need to have the specific knowledge, experience and competence required for giving advice on**

	occupational and public exposure to assist with the employer's preparations for responding to radiation emergency situations for which the employer is making the appointment. **610 Employers are required to consult an RPA where advice about occupational and public exposure is necessary for compliance with the Regulations. This should include:** **(a) contingency planning;** **(b) emergency procedures; and** **(c) remedial actions.**
Guidance 24(1)-24(2)	611 A RPA is defined in regulation 2 of the 2017 Regulations. Employers must select suitable RPAs, one or more who have the specific knowledge, experience and competence required for giving advice on the particular working conditions or circumstances for which the employer is making the appointment. Possession of proof of competence does not necessarily make the holder suitable for the type of work under consideration. In addition to the specific matters set out in Schedule 4 of the 2017 Regulations, employers are required to consult an RPA where advice is necessary for compliance with these Regulations with regard to their preparations for responding to radiation emergency exposure situations. 612 Employers who work with ionising radiation are those also considered as such under the 2017 Regulations. For the purposes of these Regulations, these are employers of emergency workers (e.g. Operators and emergency services). Except for local authorities that directly employ emergency workers, local authorities are not generally employers carrying out work with ionising radiation. 613 The advice of the RPA should cover, where relevant, but not be limited to contingency planning, emergency procedures and remedial actions. The Health and Safety Executive (HSE) statement on RPAs requires a basic understanding for all RPAs in these areas. As the 2017 Regulations apply in the event of a radiation emergency, RPAs appointed under the 2017 Regulations are expected to have sufficient knowledge and understanding to advise operators accordingly. 614 General advice on RPAs including choosing, consulting, appointing and availability of RPA advice is described in the guidance for the 2017 Regulations [40], paragraphs 250-259. 615 The 2017 Regulations specify when an RPA does not need to be consulted. These exemptions apply equally to these Regulations. In addition to these exemptions, an RPA only needs to be consulted as per Regulation 24 for activities which are in the scope of these Regulations.
Regulation 24(3)	*(3) The employer must provide any radiation protection adviser appointed by it with adequate information and facilities for the performance of the radiation protection adviser's functions arising from their consultation or appointment under this regulation.*
Guidance 24(3)	616 Employers must make sure that their RPAs have access to all the information and facilities that they need to perform their duties effectively. The facilities may need to include appropriate administrative support and radiation monitoring services.

Regulation 25 Modifications relating to the Ministry of Defence etc

Regulation 25

(1) In this regulation, any reference to

(a) "visiting forces" is a reference to visiting forces within the meaning of any provision of Part 1 of the Visiting Forces Act 1952([17]); and

(b) "headquarters or organisation" is a reference to a headquarters or organisation designated for the purposes of the International Headquarters and Defence Organisations Act 1964([18]).

(2) The Secretary of State for Defence may, in the interests of national security, by a certificate in writing, exempt—

(a) Her Majesty's Forces;

(b) visiting forces;

(c) any member of a visiting force working in or attached to any headquarters or organisation; or

(d) any person engaged in work with ionising radiation for, or on behalf of, the Secretary of State for Defence,

from all or any of the requirements or prohibitions imposed by these Regulations and any such exemption may be granted subject to conditions and a limit of time and may be revoked at any time by a certificate in writing.

(3) The requirements of regulation 18 do not have effect in relation to Her Majesty's Forces to the extent that compliance with those requirements would, in the opinion of the Secretary of State for Defence, be against the interests of national security.

Regulation 26 Disclosure of information

Regulation 26

Where any person is entitled to seek any information from an operator under these Regulations, the Secretary of State may certify in writing that, in the opinion of the Secretary of State, the provision of that information would be contrary to the interests of national security.

[17] 1952 c. 67.

[18] 1964 c. 5.

Regulation 27	Revocation
Regulation 27	*The Radiation (Emergency Preparedness and Public Information) Regulations 2001 ([19]) are revoked.*

Regulation 28	Transitional and savings provisions
Guidance 28	617 This regulation sets out a 12 month transitional period for existing duty holders under REPPIR 2001, and a 12 month transitional period for those already working with ionising radiation but not previously subject to REPPIR 2001 but had duties under the 2017 Regulations who would now be subject to REPPIR 2019. 618 Existing REPPIR 2001 duty holders may continue to comply with REPPIR 2001 until the end of that transition period, at which point they must be compliant with REPPIR 2019. 619 Duty holders not previously subject to REPPIR 2001 or the 2017 Regulations must comply with REPPIR 2019, where relevant before they commence work with ionising radiation.
Regulation 28(1)-28(3)	*(1) Any person who had a duty under the Radiation (Emergency Preparedness and Public Information) Regulations 2001 ("the 2001 Regulations") prior to these Regulations coming into force may continue to comply with the provisions of the 2001 Regulations instead of the provisions of these Regulations, notwithstanding the revocation made in regulation 27, until the end of 21st May 2020.* *(2) A person who had a duty under the 2017 Regulations, but not the 2001 Regulations, prior to these Regulations coming into force is not subject to a duty under these Regulations until the end of 21st May 2020.* *(3) From the start of 22nd May 2020, these Regulations must be complied with in full, save that:* *(a) any test of an emergency plan carried out in the three years prior to the coming into force date is to be treated as though it were a test undertaken pursuant to regulation 12; and* *(b) within 6 months of the coming into force date, if an operator has complied with its obligations under these Regulations in full, that operator may continue to work with ionising radiation or commence work with ionising radiation, as the case may be, although the local authority has not prepared its off-site emergency plan as required by these Regulations, where the regulator, exceptionally, determines that it would be reasonable so to do.*
Guidance 28(1)-28(3)	620 Employers who were working with ionising radiation under REPPIR 2001 prior to REPPIR 2019 coming into force may continue with existing arrangements whilst making plans to implement any additional measures or changes necessary to comply

[19] S.I. 2001/2975.

	with REPPIR 2019. The additional measures or changes must be brought into effect on or before the end of 21st May 2020. 621 Employers who were working with ionising radiation prior to REPPIR 2019 coming into force, but were only captured by the 2017 Regulations not REPPIR 2001 should check whether their current holdings exceed the revised thresholds in Schedule 1 of REPPIR 2019. If the current holdings exceed the thresholds in Schedule 1, employers should bring into effect any measures necessary to comply with REPPIR 2019 by the end of 21st May 2020. 622 Employers working with ionising radiation for the first time will have to comply with these Regulations from the outset. 623 Where an employer has previously prepared a Hazard Identification and Risk Evaluation report under the 2001 Regulations, that report should be superseded by the Hazard Evaluation and Consequence Assessment, as described in regulations 4 and 5. The Hazard Evaluation and Consequence Assessment should be prepared and the consequence report sent to the local authority within four months of the Regulations coming into force. This provides the minimum 8 month period for the local authority to determine the detailed emergency planning zone (where relevant) and prepare an off-site emergency plan under regulation 11(4) by the end of the transition period (21st May 2020). 624 Any changes to a detailed emergency planning zone as a consequence of the production of the Hazard Evaluation and Consequence Assessment should be made in line with the timescales set out in regulation 8. However, through co-operative working, operators should inform the relevant local authority of any forthcoming likely changes to the reports as they are identified. Local authorities can then consider if and what changes may be required to the detailed emergency planning zone or the off-site plan in advance of the changes being made. 625 Where an outline planning zone is required under these Regulations, this should be put into place on or before the end of 21st May 2020. 626 Any operator's emergency plan or off-site emergency plan that was in place previously under the 2001 Regulations should be reviewed and revised to ensure it is compliant with these Regulations by the end of 21st May 2020. 627 Any tests of emergency plans carried out within the three years prior to 22nd May 2019 can be considered to be in accordance with regulation 12 of these Regulations. The following test should be held within three years of that test and in accordance with regulation 12, unless permission is sought from the regulator for an extended period (as per regulation 12(1)). 628 Where there is a requirement to change the prior information provided to the public (as per regulation 21), or the area in which information should be provided to comply with these Regulations, this should be done so by the end of 21st May 2020.

Regulation 29 Consequential amendments

Regulation 29	*Schedule 10 makes amendments consequential upon these Regulations.*

Regulation 30 Review

Regulation 30

(1) The Secretary of State must from time to time—

(a) carry out a review of the regulatory provisions contained in these Regulations, and

(b) publish a report setting out the conclusions of the review.

(2) The first report must be published before 22nd May 2024.

(3) Subsequent reports must be published at intervals not exceeding 5 years.

(4) Section 30(3) of the Small Business, Enterprise and Employment Act 2015([20]) requires that a review carried out under this regulation must, so far as is reasonable, have regard to how the obligations under articles 7, 15, 17, 32 to 34, 53, 69 to 71, 82 and 97 to 98 of Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom([21]) are implemented in other countries which are subject to the obligations.

(5) Section 30(4) of the Small Business, Enterprise and Employment Act 2015 requires that a report published under this regulation must, in particular—

(a) set out the objectives intended to be achieved by the regulatory provision referred to in paragraph (1)(a),

(b) assess the extent to which those objectives are achieved,

(c) assess whether those objectives remain appropriate, and

(d) if those objectives remain appropriate, assess the extent to which they could be achieved in another way which involves less onerous regulatory provision.

(6) In this regulation, "regulatory provision" has the same meaning as in sections 28 to 32 of the Small Business, Enterprise and Employment Act 2015 (see section 32 of that Act).

Henley
Parliamentary Under Secretary of State
Department for Business, Energy and Industrial Strategy

26th March 2019

([20]) 2015 c. 26. Section 30(3) was amended by section 19 of the Enterprise Act 2016 (c. 12).
([21]) OJ No L13, 17.1.2014, p 1.

Schedule 1 Table of radionuclides & Quantity Ratios

Table of radionuclides
PART 1
Regulation 3(1)

Schedule 1
Part 1

Radionuclide	*Form*	*Activity (Bq)*
Actinium		
Ac-224		2×10^{11}
Ac-225		3×10^{09}
Ac-226		2×10^{10}
Ac-227		5×10^{07}
Ac-228		7×10^{11}
Aluminium		
Al-26		6×10^{11}
Americium		
Am-237		2×10^{14}
Am-238		9×10^{13}
Am-239		3×10^{13}
Am-240		1×10^{13}
Am-241		3×10^{08}
Am-242		1×10^{12}
Am-242m		3×10^{08}
Am-243		3×10^{08}
Am-244		7×10^{12}
Am-244m		2×10^{14}
Am-245		1×10^{14}
Am-246		9×10^{13}
Am-246m		1×10^{14}

Antimony	
Sb-115	2×10^{14}
Sb-116	9×10^{13}
Sb-116m	4×10^{13}
Sb-117	3×10^{14}
Sb-118m	3×10^{13}
Sb-119	1×10^{14}
Sb-120	3×10^{14}
Sb-120m	7×10^{12}
Sb-122	5×10^{12}
Sb-124	2×10^{12}
Sb-124n	1×10^{15}
Sb-125	2×10^{12}
Sb-126	3×10^{12}
Sb-126m	1×10^{14}
Sb-127	4×10^{12}
Sb-128	1×10^{13}
Sb-128m	1×10^{14}
Sb-129	2×10^{13}
Sb-130	4×10^{13}
Sb-131	5×10^{13}
Argon	
Ar-37	2×10^{20}
Ar-39	4×10^{16}
Ar-41	7×10^{13}
Arsenic	
As-69	1×10^{14}
As-70	3×10^{13}
As-71	2×10^{13}
As-72	5×10^{12}

	As-73	2×10^{13}
	As-74	5×10^{12}
	As-76	5×10^{12}
	As-77	2×10^{13}
	As-78	3×10^{13}
	Astatine	
	At-207	1×10^{13}
	At-211	2×10^{11}
	Barium	
	Ba-126	3×10^{13}
	Ba-128	4×10^{12}
	Ba-131	1×10^{13}
	Ba-131m	1×10^{15}
	Ba-133	2×10^{12}
	Ba-133m	1×10^{13}
	Ba-135m	2×10^{13}
	Ba-139	7×10^{13}
	Ba-140	3×10^{12}
	Ba-141	1×10^{14}
	Ba-142	2×10^{14}
	Berkelium	
	Bk-245	9×10^{12}
	Bk-246	2×10^{13}
	Bk-247	4×10^{08}
	Bk-249	2×10^{11}
	Bk-250	2×10^{13}
	Beryllium	
	Be-7	2×10^{14}
	Be-10	8×10^{11}
	Bismuth	

	Bi-200	6×10^{13}
	Bi-201	4×10^{13}
	Bi-202	4×10^{13}
	Bi-203	2×10^{13}
	Bi-205	8×10^{12}
	Bi-206	4×10^{12}
	Bi-207	2×10^{12}
	Bi-210	3×10^{11}
	Bi-210m	8×10^{09}
	Bi-212	1×10^{12}
	Bi-213	1×10^{12}
	Bi-214	3×10^{12}
	Bromine	
	Br-74	3×10^{13}
	Br-74m	3×10^{13}
	Br-75	6×10^{13}
	Br-76	1×10^{13}
	Br-77	8×10^{13}
	Br-80	3×10^{14}
	Br-80m	7×10^{13}
	Br-82	1×10^{13}
	Br-83	1×10^{14}
	Br-84	6×10^{13}
	Cadmium	
	Cd-104	2×10^{14}
	Cd-107	1×10^{14}
	Cd-109	2×10^{12}
	Cd-113	2×10^{11}
	Cd-113m	2×10^{11}
	Cd-115	6×10^{12}

Cd-115m	2×10^{12}
Cd-117	3×10^{13}
Cd-117m	2×10^{13}
Caesium	
Cs-125	1×10^{14}
Cs-127	2×10^{14}
Cs-129	1×10^{14}
Cs-130	2×10^{14}
Cs-131	2×10^{14}
Cs-132	2×10^{13}
Cs-134	4×10^{11}
Cs-134m	2×10^{14}
Cs-135	3×10^{12}
Cs-135m	1×10^{14}
Cs-136	5×10^{12}
Cs-137	4×10^{11}
Cs-138	5×10^{13}
Calcium	
Ca-41	6×10^{13}
Ca-45	2×10^{12}
Ca-47	2×10^{12}
Californium	
Cf-244	3×10^{12}
Cf-246	6×10^{10}
Cf-248	3×10^{09}
Cf-249	4×10^{08}
Cf-250	9×10^{08}
Cf-251	4×10^{08}
Cf-252	1×10^{09}
Cf-253	2×10^{10}

	Cf-254		5×10^{08}
	Carbon		
	C-11		2×10^{14}
		carbon dioxide	2×10^{14}
		carbon monoxide	3×10^{14}
		Methane	3×10^{14}
		Vapour	2×10^{14}
	C-14		5×10^{12}
		carbon dioxide	3×10^{12}
		carbon monoxide	3×10^{12}
		Methane	3×10^{12}
		Vapour	3×10^{12}
	Cerium		
	Ce-134		3×10^{12}
	Ce-135		1×10^{13}
	Ce-137		3×10^{14}
	Ce-137m		1×10^{13}
	Ce-139		9×10^{12}
	Ce-141		5×10^{12}
	Ce-143		7×10^{12}
	Ce-144		4×10^{11}
	Chlorine		
	Cl-36		3×10^{12}
	Cl-38		5×10^{13}
	Cl-39		6×10^{13}
	Chromium		
	Cr-48		4×10^{13}
	Cr-49		9×10^{13}
	Cr-51		2×10^{14}
	Cobalt		

	Co-55	9×10^{12}
	Co-56	1×10^{12}
	Co-57	1×10^{13}
	Co-58	5×10^{12}
	Co-58m	4×10^{14}
	Co-60	6×10^{11}
	Co-60m	5×10^{15}
	Co-61	1×10^{14}
	Co-62m	7×10^{13}
	Copper	
	Cu-60	4×10^{13}
	Cu-61	5×10^{13}
	Cu-64	6×10^{13}
	Cu-67	2×10^{13}
	Curium	
	Cm-238	6×10^{12}
	Cm-240	8×10^{09}
	Cm-241	7×10^{11}
	Cm-242	5×10^{09}
	Cm-243	4×10^{08}
	Cm-244	5×10^{08}
	Cm-245	3×10^{08}
	Cm-246	3×10^{08}
	Cm-247	3×10^{08}
	Cm-248	8×10^{07}
	Cm-249	2×10^{14}
	Cm-250	1×10^{07}
	Dysprosium	
	Dy-155	6×10^{13}
	Dy-157	1×10^{14}

	Dy-159	4×10^{13}
	Dy-165	7×10^{13}
	Dy-166	5×10^{12}
	Einsteinium	
	Es-250m	4×10^{13}
	Es-251	1×10^{13}
	Es-253	1×10^{10}
	Es-254	3×10^{09}
	Es-254m	6×10^{10}
	Erbium	
	Er-161	7×10^{13}
	Er-165	5×10^{14}
	Er-169	1×10^{13}
	Er-171	2×10^{13}
	Er-172	8×10^{12}
	Europium	
	Eu-145	1×10^{13}
	Eu-146	7×10^{12}
	Eu-147	1×10^{13}
	Eu-148	3×10^{12}
	Eu-149	4×10^{13}
	Eu-150	5×10^{11}
	Eu-150m	2×10^{13}
	Eu-152	6×10^{11}
	Eu-152m	2×10^{13}
	Eu-154	5×10^{11}
	Eu-155	4×10^{12}
	Eu-156	3×10^{12}
	Eu-157	1×10^{13}
	Eu-158	6×10^{13}

Fermium	
Fm-252	9×10^{10}
Fm-253	7×10^{10}
Fm-254	4×10^{11}
Fm-255	1×10^{11}
Fm-257	3×10^{09}
Fluorine	
F-18	8×10^{13}
Francium	
Fr-222	3×10^{12}
Fr-223	4×10^{12}
Gadolinium	
Gd-145	7×10^{13}
Gd-146	3×10^{12}
Gd-147	1×10^{13}
Gd-148	1×10^{09}
Gd-149	1×10^{13}
Gd-151	1×10^{13}
Gd-152	2×10^{09}
Gd-153	7×10^{12}
Gd-159	2×10^{13}
Gallium	
Ga-65	1×10^{14}
Ga-66	7×10^{12}
Ga-67	4×10^{13}
Ga-68	6×10^{13}
Ga-70	3×10^{14}
Ga-72	8×10^{12}
Ga-73	3×10^{13}
Germanium	

	Ge-66	7×10^{13}
	Ge-67	9×10^{13}
	Ge-68	2×10^{12}
	Ge-69	3×10^{13}
	Ge-71	6×10^{14}
	Ge-75	2×10^{14}
	Ge-77	2×10^{13}
	Ge-78	7×10^{13}
	Gold	
	Au-193	6×10^{13}
	Au-194	2×10^{13}
	Au-195	1×10^{13}
	Au-198	7×10^{12}
	Au-198m	6×10^{12}
	Au-199	2×10^{13}
	Au-200	1×10^{14}
	Au-200m	8×10^{12}
	Au-201	3×10^{14}
	Hafnium	
	Hf-170	2×10^{13}
	Hf-172	7×10^{11}
	Hf-173	4×10^{13}
	Hf-175	1×10^{13}
	Hf-177m	5×10^{13}
	Hf-178m	1×10^{11}
	Hf-179m	4×10^{12}
	Hf-180m	4×10^{13}
	Hf-181	4×10^{12}
	Hf-182	1×10^{11}
	Hf-182m	1×10^{14}

	Hf-183		8×10^{13}
	Hf-184		2×10^{13}
	Holmium		
	Ho-155		1×10^{14}
	Ho-157		4×10^{14}
	Ho-159		4×10^{14}
	Ho-161		6×10^{14}
	Ho-162		1×10^{15}
	Ho-162m		2×10^{14}
	Ho-164		7×10^{14}
	Ho-164m		5×10^{14}
	Ho-166		6×10^{12}
	Ho-166m		2×10^{11}
	Ho-167		7×10^{13}
	Hydrogen		
	H-3		1×10^{14}
		organically bound tritium	3×10^{14}
		elemental gas	7×10^{14}
		tritiated methane	2×10^{15}
		tritiated water vapour	7×10^{14}
	Indium		
	In-109		9×10^{13}
	In-110		3×10^{13}
	In-110m		5×10^{13}
	In-111		3×10^{13}
	In-112		5×10^{14}
	In-113m		2×10^{14}
	In-114		4×10^{15}
	In-114m		9×10^{11}
	In-115		7×10^{10}

	In-115m		8×10^{13}
	In-116m		5×10^{13}
	In-117		1×10^{14}
	In-117m		7×10^{13}
	In-119m		2×10^{14}
	Iodine		
	I-120		2×10^{13}
		methyl iodide	2×10^{13}
		Elemental	1×10^{13}
	I-120m		2×10^{13}
		methyl iodide	2×10^{13}
		Elemental	2×10^{13}
	I-121		9×10^{13}
		methyl iodide	9×10^{13}
		Elemental	8×10^{13}
	I-123		3×10^{13}
		methyl iodide	3×10^{13}
		Elemental	3×10^{13}
	I-124		6×10^{11}
		methyl iodide	5×10^{11}
		Elemental	4×10^{11}
	I-125		1×10^{12}
		methyl iodide	1×10^{12}
		Elemental	8×10^{11}
	I-126		3×10^{11}
		methyl iodide	3×10^{11}
		Elemental	2×10^{11}
	I-128		2×10^{14}
		methyl iodide	2×10^{14}
		Elemental	2×10^{14}

I-129		2×10^{11}
	methyl iodide	2×10^{11}
	Elemental	1×10^{11}
I-130		3×10^{12}
	methyl iodide	3×10^{12}
	Elemental	3×10^{12}
I-131		3×10^{11}
	methyl iodide	2×10^{11}
	Elemental	2×10^{11}
I-132		4×10^{13}
	methyl iodide	3×10^{13}
	Elemental	3×10^{13}
I-132m		3×10^{13}
	methyl iodide	3×10^{13}
	Elemental	2×10^{13}
I-133		4×10^{12}
	methyl iodide	3×10^{12}
	Elemental	2×10^{12}
I-134		4×10^{13}
	methyl iodide	4×10^{13}
	Elemental	4×10^{13}
I-135		2×10^{13}
	methyl iodide	1×10^{13}
	Elemental	1×10^{13}
Iridium		
Ir-182		1×10^{14}
Ir-184		3×10^{13}
Ir-185		3×10^{13}
Ir-186		2×10^{13}
Ir-186m		7×10^{13}

	Ir-187	6×10^{13}
	Ir-188	1×10^{13}
	Ir-189	2×10^{13}
	Ir-190	5×10^{12}
	Ir-190m	1×10^{15}
	Ir-190n	8×10^{13}
	Ir-192	3×10^{12}
	Ir-192n	8×10^{11}
	Ir-193m	2×10^{13}
	Ir-194	6×10^{12}
	Ir-194m	1×10^{12}
	Ir-195	7×10^{13}
	Ir-195m	3×10^{13}
	Iron	
	Fe-52	7×10^{12}
	Fe-55	2×10^{13}
	Fe-59	3×10^{12}
	Fe-60	8×10^{10}
	Krypton	
	Kr-74	2×10^{14}
	Kr-76	2×10^{14}
	Kr-77	1×10^{14}
	Kr-79	4×10^{14}
	Kr-81	3×10^{16}
	Kr-81m	7×10^{16}
	Kr-83m	3×10^{18}
	Kr-85	2×10^{16}
	Kr-85m	6×10^{14}
	Kr-87	1×10^{14}
	Kr-88	5×10^{13}

Lanthanum	
La-131	1×10^{14}
La-132	2×10^{13}
La-135	3×10^{14}
La-137	3×10^{12}
La-138	2×10^{11}
La-140	1×10^{13}
La-141	2×10^{13}
La-142	3×10^{13}
La-143	2×10^{14}
Lead	
Pb-195m	1×10^{14}
Pb-198	8×10^{13}
Pb-199	9×10^{13}
Pb-200	2×10^{13}
Pb-201	5×10^{13}
Pb-202	2×10^{12}
Pb-202m	4×10^{13}
Pb-203	3×10^{13}
Pb-205	3×10^{13}
Pb-209	1×10^{14}
Pb-210	5×10^{09}
Pb-211	2×10^{12}
Pb-212	1×10^{11}
Pb-214	3×10^{12}
Lutetium	
Lu-169	2×10^{13}
Lu-170	9×10^{12}
Lu-171	1×10^{13}
Lu-172	6×10^{12}

Lu-173		7×10^{12}
Lu-174		5×10^{12}
Lu-174m		5×10^{12}
Lu-176		4×10^{11}
Lu-176m		5×10^{13}
Lu-177		1×10^{13}
Lu-177m		1×10^{12}
Lu-178		2×10^{14}
Lu-178m		1×10^{14}
Lu-179		4×10^{13}
Magnesium		
Mg-28		4×10^{12}
Manganese		
Mn-51		7×10^{13}
Mn-52		5×10^{12}
Mn-52m		6×10^{13}
Mn-53		2×10^{14}
Mn-54		4×10^{12}
Mn-56		3×10^{13}
Mendelevium		
Md-257		1×10^{12}
Md-258		4×10^{09}
Mercury		
Hg-193	Inorganic	6×10^{13}
	Organic	8×10^{13}
	Vapour	2×10^{13}
Hg-193m	Inorganic	2×10^{13}
	Organic	3×10^{13}
	Vapour	7×10^{12}
Hg-194	Inorganic	2×10^{12}

	Organic	9×10^{11}
	Vapour	7×10^{11}
Hg-195	Inorganic	8×10^{13}
	Organic	1×10^{14}
	Vapour	2×10^{13}
Hg-195m	Inorganic	1×10^{13}
	Organic	2×10^{13}
	Vapour	3×10^{12}
Hg-197	Inorganic	3×10^{13}
	Organic	5×10^{13}
	Vapour	6×10^{12}
Hg-197m	Inorganic	1×10^{13}
	Organic	2×10^{13}
	Vapour	4×10^{12}
Hg-199m	Inorganic	2×10^{14}
	Organic	2×10^{14}
	Vapour	1×10^{14}
Hg-203	Inorganic	8×10^{12}
	Organic	8×10^{12}
	Vapour	3×10^{12}
Molybdenum		
Mo-90		2×10^{13}
Mo-93		6×10^{12}
Mo-93m		3×10^{13}
Mo-99		1×10^{13}
Mo-101		1×10^{14}
Neodymium		
Nd-136		9×10^{13}
Nd-138		1×10^{13}
Nd-139		2×10^{14}

	Nd-139m		3×10^{13}
	Nd-141		8×10^{14}
	Nd-147		6×10^{12}
	Nd-149		6×10^{13}
	Nd-151		2×10^{14}
	Neon		
	Ne-19		1×10^{16}
	Neptunium		
	Np-232		2×10^{14}
	Np-233		2×10^{15}
	Np-234		1×10^{13}
	Np-235		3×10^{13}
	Np-236		4×10^{09}
	Np-236m		3×10^{12}
	Np-237		6×10^{08}
	Np-238		6×10^{12}
	Np-239		9×10^{12}
	Np-240		6×10^{13}
	Nickel		
	Ni-56		9×10^{12}
		nickel carbonyl	9×10^{12}
	Ni-57		1×10^{13}
		nickel carbonyl	1×10^{13}
	Ni-59		6×10^{13}
		nickel carbonyl	3×10^{13}
	Ni-63		2×10^{13}
		nickel carbonyl	1×10^{13}
	Ni-65		4×10^{13}
		nickel carbonyl	3×10^{13}
	Ni-66		3×10^{12}

	nickel carbonyl	3×10^{12}
Nitrogen		
N-13	Gas	4×10^{14}
Niobium		
Nb-88		5×10^{13}
Nb-89		2×10^{13}
Nb-89m		5×10^{13}
Nb-90		7×10^{12}
Nb-93m		1×10^{13}
Nb-94		5×10^{11}
Nb-95		9×10^{12}
Nb-95m		1×10^{13}
Nb-96		8×10^{12}
Nb-97		9×10^{13}
Nb-98m		4×10^{13}
Osmium		
Os-180		5×10^{14}
Os-181		6×10^{13}
Os-182		2×10^{13}
Os-185		7×10^{12}
Os-189m		4×10^{14}
Os-191		9×10^{12}
Os-191m		7×10^{13}
Os-193		1×10^{13}
Os-194		3×10^{11}
Oxygen		
O-15	Gas	2×10^{15}
Palladium		
Pd-100		1×10^{13}
Pd-101		8×10^{13}

	Pd-103	3×10^{13}
	Pd-107	5×10^{13}
	Pd-109	1×10^{13}
	Phosphorus	
	P-32	7×10^{11}
	P-33	4×10^{12}
	Platinum	
	Pt-186	8×10^{13}
	Pt-188	1×10^{13}
	Pt-189	7×10^{13}
	Pt-191	3×10^{13}
	Pt-193	2×10^{14}
	Pt-193m	2×10^{13}
	Pt-195m	1×10^{13}
	Pt-197	2×10^{13}
	Pt-197m	1×10^{14}
	Pt-199	2×10^{14}
	Pt-200	8×10^{12}
	Plutonium	
	Pu-234	1×10^{12}
	Pu-235	2×10^{15}
	Pu-236	8×10^{08}
	Pu-237	4×10^{13}
	Pu-238	3×10^{08}
	Pu-239	3×10^{08}
	Pu-240	3×10^{08}
	Pu-241	1×10^{10}
	Pu-242	3×10^{08}
	Pu-243	8×10^{13}
	Pu-244	3×10^{08}

	Pu-245	1×10^{13}
	Pu-246	2×10^{12}
	Polonium	
	Po-203	8×10^{13}
	Po-205	7×10^{13}
	Po-206	1×10^{11}
	Po-207	5×10^{13}
	Po-208	3×10^{09}
	Po-209	2×10^{09}
	Po-210	4×10^{09}
	Potassium	
	K-40	1×10^{12}
	K-42	2×10^{13}
	K-43	3×10^{13}
	K-44	5×10^{13}
	K-45	8×10^{13}
	Praseodymium	
	Pr-136	1×10^{14}
	Pr-137	1×10^{14}
	Pr-138m	4×10^{13}
	Pr-139	2×10^{14}
	Pr-142	6×10^{12}
	Pr-142m	6×10^{14}
	Pr-143	5×10^{12}
	Pr-144	2×10^{14}
	Pr-145	2×10^{13}
	Pr-147	2×10^{14}
	Promethium	
	Pm-141	2×10^{14}
	Pm-143	9×10^{12}

	Pm-144	2×10^{12}
	Pm-145	8×10^{12}
	Pm-146	1×10^{12}
	Pm-147	5×10^{12}
	Pm-148	3×10^{12}
	Pm-148m	2×10^{12}
	Pm-149	8×10^{12}
	Pm-150	3×10^{13}
	Pm-151	1×10^{13}
	Protactinium	
	Pa-227	4×10^{11}
	Pa-228	4×10^{11}
	Pa-230	4×10^{10}
	Pa-231	2×10^{08}
	Pa-232	3×10^{12}
	Pa-233	5×10^{12}
	Pa-234	1×10^{13}
	Radium	
	Ra-223	3×10^{09}
	Ra-224	8×10^{09}
	Ra-225	4×10^{09}
	Ra-226	3×10^{09}
	Ra-227	6×10^{13}
	Ra-228	2×10^{09}
	Rhenium	
	Re-177	5×10^{14}
	Re-178	1×10^{14}
	Re-181	2×10^{13}
	Re-182	5×10^{12}
	Re-182m	3×10^{13}

	Re-184	6×10^{12}
	Re-184m	3×10^{12}
	Re-186	5×10^{12}
	Re-186m	2×10^{12}
	Re-187	1×10^{15}
	Re-188	6×10^{12}
	Re-188m	3×10^{14}
	Re-189	1×10^{13}
	Rhodium	
	Rh-99	1×10^{13}
	Rh-99m	9×10^{13}
	Rh-100	1×10^{13}
	Rh-101	4×10^{12}
	Rh-101m	4×10^{13}
	Rh-102	2×10^{12}
	Rh-102m	9×10^{11}
	Rh-103m	2×10^{15}
	Rh-105	2×10^{13}
	Rh-106m	3×10^{13}
	Rh-107	3×10^{14}
	Rubidium	
	Rb-79	9×10^{13}
	Rb-81	9×10^{13}
	Rb-81m	8×10^{14}
	Rb-82m	3×10^{13}
	Rb-83	6×10^{12}
	Rb-84	4×10^{12}
	Rb-86	3×10^{12}
	Rb-87	6×10^{12}
	Rb-88	9×10^{13}

Rb-89		8×10^{13}
Ruthenium		
Ru-94		9×10^{13}
	ruthenium tetroxide	8×10^{13}
Ru-97		6×10^{13}
	ruthenium tetroxide	6×10^{13}
Ru-103		7×10^{12}
	ruthenium tetroxide	1×10^{13}
Ru-105		3×10^{13}
	ruthenium tetroxide	3×10^{13}
Ru-106		4×10^{11}
	ruthenium tetroxide	8×10^{11}
Samarium		
Sm-141		1×10^{14}
Sm-141m		7×10^{13}
Sm-142		5×10^{13}
Sm-145		1×10^{13}
Sm-146		3×10^{09}
Sm-147		3×10^{09}
Sm-151		7×10^{12}
Sm-153		1×10^{13}
Sm-155		3×10^{14}
Sm-156		3×10^{13}
Scandium		
Sc-43		4×10^{13}
Sc-44		2×10^{13}
Sc-44m		4×10^{12}
Sc-46		2×10^{12}
Sc-47		1×10^{13}
Sc-48		5×10^{12}

	Sc-49	1×10^{14}
	Selenium	
	Se-70	6×10^{13}
	Se-73	3×10^{13}
	Se-73m	2×10^{14}
	Se-75	4×10^{12}
	Se-79	2×10^{12}
	Se-81	3×10^{14}
	Se-81m	1×10^{14}
	Se-83	6×10^{13}
	Silicon	
	Si-31	6×10^{13}
	Si-32	3×10^{11}
	Silver	
	Ag-102	7×10^{13}
	Ag-103	1×10^{14}
	Ag-104	5×10^{13}
	Ag-104m	7×10^{13}
	Ag-105	1×10^{13}
	Ag-106	2×10^{14}
	Ag-106m	6×10^{12}
	Ag-108m	6×10^{11}
	Ag-110m	1×10^{12}
	Ag-111	6×10^{12}
	Ag-112	2×10^{13}
	Ag-115	1×10^{14}
	Sodium	
	Na-22	1×10^{12}
	Na-24	1×10^{13}
	Strontium	

	Sr-80		3×10^{13}
	Sr-81		8×10^{13}
	Sr-82		1×10^{12}
	Sr-83		2×10^{13}
	Sr-85		1×10^{13}
	Sr-85m		6×10^{14}
	Sr-87m		2×10^{14}
	Sr-89		2×10^{12}
	Sr-90		2×10^{11}
	Sr-91		1×10^{13}
	Sr-92		2×10^{13}
	Sulphur		
	S-35	Inorganic	1×10^{13}
		Organic	1×10^{13}
		gas / vapour	1×10^{11}
	Tantalum		
	Ta-172		7×10^{13}
	Ta-173		4×10^{13}
	Ta-174		8×10^{13}
	Ta-175		4×10^{13}
	Ta-176		2×10^{13}
	Ta-177		7×10^{13}
	Ta-178m		7×10^{13}
	Ta-179		3×10^{13}
	Ta-180		1×10^{14}
	Ta-182		2×10^{12}
	Ta-182m		4×10^{14}
	Ta-183		5×10^{12}
	Ta-184		1×10^{13}
	Ta-185		1×10^{14}

Ta-186		1×10^{14}
Technetium		
Tc-93		7×10^{13}
Tc-93m		1×10^{14}
Tc-94		3×10^{13}
Tc-94m		5×10^{13}
Tc-95		4×10^{13}
Tc-95m		8×10^{12}
Tc-96		8×10^{12}
Tc-96m		7×10^{14}
Tc-97		2×10^{13}
Tc-97m		6×10^{12}
Tc-98		5×10^{11}
Tc-99		2×10^{12}
Tc-99m		3×10^{14}
Tc-101		3×10^{14}
Tc-104		6×10^{13}
Tellurium		
Te-116		5×10^{13}
	Vapour	6×10^{13}
Te-121		2×10^{13}
	Vapour	2×10^{13}
Te-121m		3×10^{12}
	Vapour	2×10^{12}
Te-123		4×10^{12}
	Vapour	2×10^{12}
Te-123m		4×10^{12}
	Vapour	3×10^{12}
Te-125m		5×10^{12}
	Vapour	6×10^{12}

Te-127		4×10^{13}
	Vapour	5×10^{13}
Te-127m		2×10^{12}
	Vapour	2×10^{12}
Te-129		1×10^{14}
	Vapour	1×10^{14}
Te-129m		2×10^{12}
	Vapour	2×10^{12}
Te-131		9×10^{13}
	Vapour	8×10^{13}
Te-131m		4×10^{12}
	Vapour	3×10^{12}
Te-132		4×10^{12}
	Vapour	2×10^{12}
Te-133		8×10^{13}
	Vapour	8×10^{13}
Te-133m		2×10^{13}
	Vapour	2×10^{13}
Te-134		6×10^{13}
	Vapour	6×10^{13}
Terbium		
Tb-147		3×10^{13}
Tb-149		5×10^{12}
Tb-150		2×10^{13}
Tb-151		2×10^{13}
Tb-153		1×10^{13}
Tb-154		1×10^{13}
Tb-155		4×10^{13}
Tb-156		7×10^{12}
Tb-156m		5×10^{13}

	Tb-156n	9×10^{13}
	Tb-157	2×10^{13}
	Tb-158	6×10^{11}
	Tb-160	2×10^{12}
	Tb-161	9×10^{12}
	Thallium	
	Tl-194	2×10^{14}
	Tl-194m	7×10^{13}
	Tl-195	1×10^{14}
	Tl-197	2×10^{14}
	Tl-198	5×10^{13}
	Tl-198m	7×10^{13}
	Tl-199	2×10^{14}
	Tl-200	3×10^{13}
	Tl-201	9×10^{13}
	Tl-202	2×10^{13}
	Tl-204	6×10^{12}
	Thorium	
	Th-226	6×10^{11}
	Th-227	3×10^{09}
	Th-228	7×10^{08}
	Th-229	1×10^{08}
	Th-230	3×10^{08}
	Th-231	2×10^{13}
	Th-232	3×10^{08}
	Th-234	2×10^{12}
	Thulium	
	Tm-162	9×10^{13}
	Tm-166	2×10^{13}
	Tm-167	1×10^{13}

	Tm-170	2×10^{12}
	Tm-171	2×10^{13}
	Tm-172	5×10^{12}
	Tm-173	3×10^{13}
	Tm-175	2×10^{14}
	Tin	
	Sn-110	3×10^{13}
	Sn-111	2×10^{14}
	Sn-113	6×10^{12}
	Sn-117m	7×10^{12}
	Sn-119m	9×10^{12}
	Sn-121	3×10^{13}
	Sn-121m	5×10^{12}
	Sn-123	2×10^{12}
	Sn-123m	2×10^{14}
	Sn-125	2×10^{12}
	Sn-126	8×10^{11}
	Sn-127	3×10^{13}
	Sn-128	5×10^{13}
	Titanium	
	Ti-44	2×10^{11}
	Ti-45	4×10^{13}
	Tungsten	
	W-176	1×10^{14}
	W-177	9×10^{13}
	W-178	5×10^{13}
	W-179	2×10^{15}
	W-181	9×10^{13}
	W-185	2×10^{13}
	W-187	1×10^{13}

	W-188	4×10^{12}
	Uranium	
	U-230	2×10^{09}
	U-231	2×10^{13}
	U-232	8×10^{08}
	U-233	3×10^{09}
	U-234	3×10^{09}
	U-235	3×10^{09}
	U-236	3×10^{09}
	U-237	8×10^{12}
	U-238	4×10^{09}
	U-239	3×10^{14}
	U-240	8×10^{12}
	Vanadium	
	V-47	9×10^{13}
	V-48	3×10^{12}
	V-49	3×10^{14}
	Xenon	
	Xe-120	3×10^{14}
	Xe-121	7×10^{13}
	Xe-122	2×10^{15}
	Xe-123	2×10^{14}
	Xe-125	4×10^{14}
	Xe-127	4×10^{14}
	Xe-129m	4×10^{15}
	Xe-131m	1×10^{16}
	Xe-133	3×10^{15}
	Xe-133m	3×10^{15}
	Xe-135	4×10^{14}
	Xe-135m	4×10^{14}

Xe-138	1×10^{14}
Ytterbium	
Yb-162	3×10^{14}
Yb-166	1×10^{13}
Yb-167	6×10^{14}
Yb-169	6×10^{12}
Yb-175	2×10^{13}
Yb-177	8×10^{13}
Yb-178	7×10^{13}
Yttrium	
Y-86	9×10^{12}
Y-86m	2×10^{14}
Y-87	2×10^{13}
Y-88	2×10^{12}
Y-90	3×10^{12}
Y-90m	4×10^{13}
Y-91	2×10^{12}
Y-91m	3×10^{14}
Y-92	2×10^{13}
Y-93	7×10^{12}
Y-94	9×10^{13}
Y-95	1×10^{14}
Zinc	
Zn-62	9×10^{12}
Zn-63	7×10^{13}
Zn-65	3×10^{12}
Zn-69	2×10^{14}
Zn-69m	2×10^{13}
Zn-71m	3×10^{13}
Zn-72	6×10^{12}

	Zirconium	
	Zr-86	1×10^{13}
	Zr-88	6×10^{12}
	Zr-89	1×10^{13}
	Zr-93	1×10^{12}
	Zr-95	3×10^{12}
	Zr-97	4×10^{12}
Schedule 1 Part 1	629 The quantities of radionuclides capable of resulting in a radiation emergency are derived from work by PHE (see PHE report: 'Derivation of reference values for Schedule 1 of the REPPIR 2019 regulations. Specified quantities of inventory holdings for more than 700 radionuclides'. 2019 [12])	

Schedule 1 Quantity ratios for more than one radionuclide PART 2

Regulation 3(4)

Schedule 1 Part 2

For the purpose of regulation 3(4), the quantity ratio for more than one radionuclide is the sum of the quotients of the quantity of a radionuclide present Q_p divided by the quantity of that radionuclide specified in the appropriate column of Part 1 of this Schedule Q_{lim}, namely—

$$\sum \frac{Q_p}{Q_{\text{lim}}}$$

Schedule 2 Mass of Fissile Material

Regulation 3(1)

Schedule 2

For the purpose of regulation 3(1), the specified mass of a fissile material set out below is—

(a)plutonium as Pu-239 or Pu-241 or as a mixture of plutonium isotopes containing Pu-239 or Pu-241 – 150 grams;

(b)uranium as U-233 – 150 grams;

(c)uranium enriched in U-235 to more than 1% but not more than 5% - 500 grams; and

(d)uranium enriched in U-235 to more than 5% - 250 grams.

Guidance **Schedule 2**	630 The masses relate to the potential for criticality of the fissile material.

Schedule 3 Assessment of Consequences Requirements

Regulation 5(1)

Schedule 3(1)-3(2)	*1. The following requirements must be complied with in the assessment of consequences required by regulation 5.* *2. The assessment must be based on a suitable and sufficient range of source terms representing the range of potential emergencies which might arise from the work with ionising radiation.*
Guidance **Schedule 3(1)-3(2)**	631 Schedule 3 defines the requirements that must be complied with when performing the assessment of consequences required by Regulation 5. The first of these requirements is that the assessment must be based on a suitable and sufficient range of source terms representing the range of potential emergencies which might arise from the work with ionising radiation. The suitable and sufficient source terms are those identified by the operator on the basis of expert judgement and evaluation when following the guidance provided in the ACOP for Regulation 5. For each of these source terms, an off-site consequence assessment must be performed consistent with the requirements of Schedule 3. 632 When assessing the off-site consequences of potential radiation emergencies from their premises, operators need to estimate the likely exposures to members of the public and emergency workers that may result from such events so that doses can be restricted and the need for; extent and content of emergency plans (regulations 10 and 11) can be established. Assessments of this kind are complex and operators should consult their RPA and, where appropriate, a radiological consequence assessment specialist. 633 As discussed in the guidance for Regulation 4, in complex cases the evaluation may lead to many source terms that for the purposes of practical analysis may be grouped together. This can be achieved through the use of one or more representative but bounding source terms according to common characteristics such as similar initiating events, common facilities or equipment, or common consequences. The differing characteristics to be considered by the operator should also include different time frames associated with a release, and differing combinations and quantities of radionuclides involved. 634 For the purposes of evaluating potential off-site radiation doses to members of the public the operator should evaluate both the effective dose, and equivalent dose to the thyroid where relevant. Where the exposure is due to a release the choice of methods for performing the atmospheric dispersion modelling is for the operator to justify. One methodology for performing such analysis was developed by PHE and adopts a probabilistic approach, sampling real historic weather data [28]. An alternate approach using straight line Gaussian plume modelling is also possible as discussed in the guidance to Schedule 3(3)-3(6) below. 635 To support operators of smaller, lower risk premises, by simplifying the process of performing a consequence assessment to determine the extent of emergency planning, PHE have produced datafiles that such operators may request from them [15]. The datafiles comprise of time integrated activity concentrations in air per unit release and ground deposition concentrations per unit release, for a range of chemical forms,

	and will be applicable to a wide range of radionuclides. These datafiles remove the need for the operators of smaller, lower risk premises to purchase meteorological data and perform significant amounts of atmospheric dispersion modelling as part of the requirements of a full consequence assessment. These datafiles are not as representative as performing a site-specific assessment. They are deemed to be fit for purpose for smaller, lower risk premises where the operator demonstrates that the unmitigated radiological consequences from a bounding hazard analysis case are in the lower region of the REPPIR risk framework (Appendix 2, Figure 3). Here only outline planning is required and for which contingency planning under the 2017 Regulations would be sufficient as discussed in paragraph 105.
Schedule 3(3)-3(6)	*3. The calculations undertaken in order to reach the assessment must consider a range of weather conditions (if weather conditions are capable of affecting the extent of the radiation emergency) to account for—* *(a) the likely consequences of such conditions; and* *(b) consequences which are less likely, but with greater impact.* *4. The assessment must consider the consequences of the radiation emergencies identified in regulation 4 on the population within the geographical extent of the potential radiation emergency, accounting for different characteristics, including, for example age and other characteristics which would render specific members of the public especially vulnerable.* *5. The assessment must consider what would be an effective and, where relevant, equivalent dose to the thyroid in the context of each radiation emergency identified.* *6. The assessment must include all relevant pathways by which members of the public could be exposed to radiation in the context of each radiation emergency identified.*
Guidance Schedule 3(3)-3(6)	**Considering a range of weather conditions** 636 Potential options for atmospheric dispersions modelling include a probabilistic assessment approach based on the application of historical weather data for the specific location of the premises. This enables consideration of a full range of weather conditions including those which are less likely and conditions which include precipitation [28]. For operators of smaller, lower risk premises, the simplifying datafiles produced by PHE [15], [28] and discussed in paragraph 635 above represent one means of performing such assessments without the need to develop the in-house capability to perform such assessments. Further details about the PHE datafiles can be found on the PHE website [15]. Alternatively, the operator may adopt a more deterministic approach using a straight-line Gaussian plume model and performing a range of sensitivity studies for differing stability categories and the effects of precipitation. 637 The effect of considering precipitation during the release varies with exposure pathway and radionuclide. In general, pathways which primarily depend on concentrations in air may exhibit lower doses in wet conditions than in dry, because of the influence of precipitation in lowering the concentrations in air due to enhanced deposition. Pathways which depend primarily on deposition on the ground will tend to exhibit higher doses due to the potential for increased ground deposition occurring during precipitation. 638 If novel calculation methods and techniques, for which there is not an existing track record of use in safety submissions in the UK, are proposed to be used for the atmospheric dispersion modelling applied in the consequence assessment then the analyses will need to adequately represent the physical and chemical processes taking place. Where possible, the analytical models should be validated by comparison with actual experience, appropriate experiments or tests. The validation should be of the

	model as a whole or, where this is not practicable, on a module basis, against experiments that replicate as closely as possible the expected conditions. Care should be exercised in the interpretation of experiments to take account of uncertainties in replicating the range of test conditions. The limits of applicability of analytical models should be identified. Where validation against experiments or tests is not possible, a comparison with other, different, calculation methods may be acceptable. Where possible, independent checks using diverse methods or analytical models should be carried out to supplement the original analysis. It is for the operator to justify the approach they have taken in meeting the requirements in the regulations. **Consideration of the population within the geographical extent of the potential radiation emergency** 639 To inform emergency planning arrangements for persons off-site likely to be exposed to radiation, the nature and magnitude of the risks to persons off-site (including members of the public and emergency workers) should be assessed. 640 When considering the population as a whole, where relevant, it is generally sufficient to consider three age groups to represent the differing habits and dose assessment data for the range of ages that need to be planned for. These are infants aged 1 year, children aged 10 years, and young adults aged 20 years. Additionally, doses to the foetus and breast fed-infant should also be considered for those radionuclides where these could be potentially limiting. 641 For the purposes of evaluating potential off-site doses to off-site emergency workers the operator should consider the emergency arrangements that are likely to be required in an off-site emergency plan for both the detailed emergency planning zone and the outline planning zone where relevant. Where an off-site emergency plan already exists, this will be a useful initial source of information. The operator, in consultation with the local authority, should identify the potential duties, locations and durations for a representative range of off-site emergency workers, for which realistic dose estimates should be provided to inform the off-site plan. **Consideration of all relevant pathways** 642 Dose assessments should consider all relevant external and internal dose pathways, including inhalation, resuspension, ground gamma, ingestion (including commercial and domestic leafy green vegetables and milk), and cloud gamma. This will include assessment of any releases of radioactive material to air or inland watercourses and also doses from direct radiation. 643 Consideration should also be given both to the likely duration of potential releases or external exposure scenarios due to direct shine from a source and the period in which they are most likely to commence.
Schedule 3(7)-3(8)	*7. The assessment must identify any protective action that may need to be taken for the range of potential radiation emergencies.* *8. The assessment must assess the consequences of suitable and sufficient source terms by distance and by exposure pathway, and the distances to which protective action would be required based on the United Kingdom Emergency Reference Levels, published by Public Health England.* [27]
ACOP (i) for Schedule 3(7)-3(8)	**Assumptions for the radiological consequence assessment** **644 The consequence assessment performed in accordance with Schedule 3 should identify the range of potential consequences for:** **a) the short-term (at least two days following the start of the release or direct**

	exposure); and **b) the long-term (in the twelve months following the start of the release or direct exposure).** **645 The short term consequence assessment should be used to determine:** **a) the distance at which relevant Emergency Reference Levels (ERLs) would suggest that urgent protective actions are required for persons off-site;** **b) the recommended extent of the geographical extent on which the local authority will determine the detailed emergency planning zone; and** **c) the effective dose to emergency workers for both on-site and off-site for comparison against the relevant reference level.** **646 The long term consequence assessment should be used to identify the effective dose to members of the public off-site for comparison against the relevant reference level in order to inform emergency planning.** **Operator's determination of recommended distances for urgent protective action** **647 Each suitable and sufficient source term identified under the ACOP for Regulation 5 that lies within the "detailed emergency planning required" region of the REPPIR risk framework (Appendix 2, Table 3), supplemented by any additional source terms identified for the sensitivity study required by the ACOP for Regulation 5, should be selected for analysis.** **648 For each of these selected source terms the distance at which the potential dose saving (averted dose) from all relevant exposure pathways becomes equal to the lower ERL following implementation of the relevant urgent protective action (sheltering, and where appropriate, evacuation and stable iodine) should be calculated. These calculations should consider the most vulnerable member of the public outside the premises.** **649 The largest distance calculated for each urgent protective action from all the selected source terms should be considered for recommendation as a candidate distance for that particular urgent protective action.** **650 In order to inform local authority planning for the implementation of urgent protective actions, the operator should also evaluate the distances where the upper ERLs may be applicable. Important factors such as the timescales within which protective action should be planned to be carried out should also be identified.**
Guidance (i) for Schedule 3(7)-3(8)	**Principles for selecting the recommended distance for an urgent protective action** 651 The ACOP (i) for Schedule 3(7)-3(8) defines a general method for the operator to calculate a recommended candidate distance for each of the urgent protective actions. 652 In practice, for many operators it will only be necessary to recommend a candidate distance for the single urgent protective action of sheltering (given the nature and size of a potential release) and so this has been chosen as an example to illustrate how the calculation defined in ACOP (i) for Schedule 3(7)-3(8) should be performed. The example assumes the dose is dominated by the inhalation exposure pathway and the facility is not an operating reactor where use of stable iodine tablets may be a dominate consideration. The calculation is performed using the lower ERL for sheltering. The ERL is a measure of averted dose and it is calculated using two dose calculations. In the first calculation it should be assumed that the exposed individuals are subject to no protective measures and are outside during the entire exposure period (with no protection afforded from being inside a building). The second calculation is for the dose with the relevant protective action in place. The dose averted by this protective action is the difference between the two values.

	653 PHE's analysis [27] of the effect of sheltering on inhalation exposures shows a typical dose reduction factor (DRF) of approximately 0.6 (derived on the basis of a combination of modelling and literature review). This value assumes an inhalation dose to an individual sheltering during the entire passage of the plume, until both the indoor and outdoor air concentrations fall back down to zero (or close to it), with no opening of windows and doors to the external environment. Under such circumstances it may be assumed that the DRF remains constant irrespective of the release duration [27]. The fraction of the dose that is averted is therefore 1 – DRF = 0.4 which implies that the distance where the lower ERL for sheltering of 3 mSv is at the distance where the outdoor effective dose is 7.5 mSv (i.e. 3 mSv divided by 0.4.). For premises where inhalation is the dominant exposure pathway (other than operating reactors), this outdoor effective dose of 7.5 mSv can be used as a surrogate for identifying the initial candidate minimum distance for the urgent protection action of sheltering. 654 In the case of iodine inhalation the lower ERL for stable iodine administration is an equivalent dose of 30 mSv to the thyroid with a tissue weighting factor of 0.04 [27]. Iodine tablets are particularly effective if administered early enough during the release but this effectiveness reduces if their administration is delayed a number of hours [41]. For example, a delay of four hours could reduce the DRF to 0.5 [42]. It is for the operator to justify what is the appropriate DRF to assume based on its knowledge of the timescale for the release and whether there is scope for the pre-distribution of KI tablets and early administration. 655 Doses from direct irradiation, criticality or radionuclides that contribute significantly to external doses will need to be considered when assessing the distance for the urgent protective action against the lower ERL for premises where pathways other than inhalation are significant. For example, where the effective dose is dominated by direct exposure from airborne gases and particles which have been deposited on the ground in inhabited areas the lower ERL for sheltering applies and the DRF for external gamma dose is 0.15 for typical residential brick-built homes and 0.05 for multi-storey buildings [27]. 656 Once the technical assessment described in the paragraphs above is complete, the operator may wish to exercise judgement to adjust the candidate distances for the urgent protective actions calculated by taking into account: (a) in the case of releases, the range of weather conditions assumed and their likelihood; (b) that practical protective actions that may still be relevant at outdoor effective doses below 7. 5 mSv such as other urgent protective actions including personal decontamination, medical intervention and reassurance monitoring; (c) relevant international IAEA standards and guidance; and (d) the need to optimise protection strategies, including consideration of serious consequences to human life, health and safety, quality of life, property, and the environment that define a radiation emergency when assessed against the Impact Table in Appendix 2, Figure 1. 657 Once these have been considered, the operator should recommend the distances for each of the relevant urgent protective actions, justifying any assumptions and judgments that are made. The minimum distance of the urgent protective action is usually taken as a radial distance in kilometres (km).
ACOP (ii) for Schedule 3(7)-3(8)	**Operator's recommendation for the minimum geographical extent for the detailed emergency planning zone** **658 The largest of the distances recommended for the urgent protective actions identified against the lower ERL should be selected as the recommended distance for the minimum geographical extent of the detailed emergency planning zone.**

Guidance (ii) for Schedule 3(7)-3(8)	**Operator's recommendation for the minimal geographical extent for the detailed emergency planning zone** 659 The ACOP (ii) for Schedule 3(7)-3(8) defines a method by which the operator can determine a candidate recommended distance for the geographical extent of the detailed planning zone. As with the candidate recommended distance for the urgent protection actions discussed under the ACOP (i) for Schedule 3(7)-3(8), the operator may exercise judgement to adjust this candidate distance. 660 In practice, the expectation is that once the operator has determined the recommended distances for each of the relevant urgent protective actions in line with paragraphs 644 - 657, the operator should recommend a minimum geographical extent for the detailed emergency planning zone which is identical to the largest of these recommended urgent protective action distances. 661 The operator's recommendation of the geographical extent of the detailed emergency planning zone should usually be a circular radial distance (km) with the centre point clearly indicated. For premises with multiple facilities located around a site, complex or campus that may have a number of potential centre points, the operator may describe one overall distance that encompasses all facilities, or separate extents that relate to each relevant facility. **Principles for recommending the geographical extent for the outline planning zone** 662 Operators regulated by HSE that are responsible for recommending the geographical extent for an outline planning zone under regulation 9(1)(b), should perform similar calculations to the ones described in the paragraphs above for determining the detailed emergency planning zone, but this time considering a representative range of source terms that lie in the 'outline planning required' region of the REPPIR risk framework (Appendix 2, Figure 3). However, in performing the assessment the upper ERL may be considered more appropriate and consideration of the timescales of the release may be taken into account when selecting which source term is to be used in the calculation. 663 Once the technical assessment described above is complete, the operator should discuss with the local authority to decide whether an outline planning zone is required or whether generic arrangements are adequate. These existing arrangements might include national standard operational principles for emergences services, and COMAH arrangements coupled with a communications plan. Further guidance can be found in the guidance to Regulation 9(3).
ACOP (iii) for Schedule 3(7)-3(8)	**Assessment of total residual effective doses for members of the public** **664 The assessment of the total residual effective doses of a radiation emergency should consider effective doses to members of the public from the boundaries of the premises out to a distance which would correspond to 1 mSv effective dose in the first twelve months following an emergency. Urgent protective actions, including food restrictions at the levels corresponding to the EU Maximum Permitted Levels in food currently applicable to the UK, should be assumed to have been implemented.** **665 Ingestion doses from domestic food production should be based on the location of food production in the vicinity of the individual.**
Guidance (iii) for Schedule 3(7)-3(8)	**Assessment of total residual effective doses for emergency workers** 666 The assessment of the total residual effective doses of a radiation emergency should consider effective doses to emergency workers both on-site and off-site out to a distance equivalent to 20 mSv effective dose for at least the first two days following a release or direct exposure.

	667 It is recognised that calculating on-site doses to emergency workers is a potentially complex and difficult assessment. The operator will need to exercise considerable judgement on the scope of the analysis, with the principle objective being to provide practical information to help inform emergency planning. 668 As noted in paragraph 159, this information should be shared, as appropriate, with relevant organisations under regulations 13 and 15.
Schedule 3(9)	*9. In this Schedule "source term" means the radioactivity which could give rise to direct external exposures from the premises or which could be released to the environment in a radiation emergency and, for releases, includes—* *(a) the amount of radionuclide released;* *(b) the time distribution of the release;* *(c) the energy associated with atmospheric release; and* *(d) the likely chemical and physical form of the radionuclides in the release.*
Guidance **Schedule 3(9)**	669 Sub clauses (a) to (d) apply in the case of a release and mean: (a) For each identified radiation emergency the source term will be the quantity of radioactive substances which is released to atmosphere. (b) The time distribution should include best-estimate values for the time when the release will commence and for its duration, and the rate at which it occurs. (c) The energy associated with atmospheric release. It is related to the energy associated with the buoyancy and momentum of the plume at the point it is released into the atmosphere. For example, heat and pressure may provide for releases to be lofted and propelled respectively into the atmosphere. (d) Where relevant, this should include information on particle size and whether the radionuclides are likely to be organically bound (for example whether isotopes of iodine are likely to be in particulate, elemental vapour or organic form).

Schedule 4 — Particulars to be included in a consequences report

Regulation 7(3)

Schedule 4 Parts 1-3

PART 1
Factual Information

1. The following factual information must be provided in the operator's consequences report—

(a) the name and address of the operator;
(b) the postal address of the premises where the radioactive substance will be processed, manufactured, used or stored, or where the facilities for processing, manufacture, use or storage exist;
(c) the date on which it is anticipated that the work with ionising radiation will commence or, if it has already commenced, a statement to that effect.

	PART 2 ***Recommendations*** *2. The operator must include the following recommendations in the consequences report—* *(a) the proposed minimum geographical extent, if any; and* *(b) the minimum distances to which urgent protective action may need to be taken, marking against each distance the timescale for implementation of the relevant action.* *3. Where a minimum geographical extent is recommended under paragraph 2, the operator must also include within the consequences report—* *(a) the recommended urgent protective action to be taken within that zone, if any, together with timescales for the implementation of that action; and* *(b) details of the environmental pathways at risk, in order to support the determination of food and water restrictions in the event of a radiation emergency.* ***PART 3*** ***Rationale*** *4. The operator must set out the rationale supporting each recommendation made in the consequences report.* *5. In particular, the operator must set out—* *(a) the rationale for its recommendation on the minimum distances for which urgent protective action may need to be taken; and* *(b) where the operator and local authority have agreed that no off-site planning is required, and therefore no emergency planning is recommended, the rationale for that agreement.*
ACOP Schedule 4 Parts 1-3	**Default outline planning zones** **670 Where under Regulation 9(1)(a) the outline planning zone is determined in accordance with Schedule 5, the operator should set out in the consequence report what is the appropriate distance for outline planning in accordance with paragraph 2a of Schedule 4.** **671 Where under Regulation 9(1)(a) the outline planning zone is determined by the Secretary of State for Defence, the operator should set out in the consequence report what is the appropriate distance for outline planning in accordance with paragraph 2a of Schedule 4.**
Guidance Schedule 4 Parts 1-3	672 The water restrictions under 3b are protective actions taken to protect the environment for the purposes of human health. 673 The consequence report should contain all the information required in Schedule 4. The reports submitted should be self-standing and contain sufficient information for the relevant regulator to be able to confirm the conclusions reached. The documentation should also have been subject to appropriate document control procedures before issue.

Schedule 5 Determination of Outline Planning Zone

Regulation 9(1)(a)

Schedule 5

1. The following table applies for the purpose of setting the outline planning zone under regulation 9(1)(a).

Category	*Nature of site*	*Outline planning zone*
1	*Sites involved in the processing of High Level Waste or storing in excess of 100 tonnes of Plutonium*	*50 kilometres*
2	*Operating nuclear power plants and decommissioning nuclear power plants with a presence of irradiated fuels*	*30 kilometres*
3	*Sites with a significant presence of enriched uranium and decommissioning nuclear sites (other than power plants) with a significant presence of irradiated fuels*	*5 kilometres*
4	*Decommissioned sites without a significant presence of irradiated fuels*	*1 kilometre*
5	*Sites involved in the production of radiopharmaceuticals*	*No outline planning zone*

2. In the Table at paragraph 1 "High Level Waste" means waste which is radioactive enough for the heat released as a result of radioactive decay to increase significantly its temperature and the temperature of its surroundings and includes—

(a) the liquid residue that contains most of the radioactivity from the reprocessing of spent nuclear fuel;

(b) this residue once it has solidified; or

(c) any other waste with similar radiological characteristics.

Guidance Schedule 5

674 The outline planning zone distances are a radius from a clearly indicated centre point.

675 All Civil nuclear sites identified under regulation 9(1)(a), have a default outline planning zone as referred to in schedule 5 and as described in the guide for each category below. For any civil nuclear sites where REPPIR does not apply by virtue of Regulation 3(2) then no default outline planning zone applies.

676 If the nature of the site is not described in Schedule 5 but the site is a civil nuclear site identified under regulation 9(1)(a), no default outline planning zone is required under this Schedule. Where clarification is required by operators about how to categorise their site, they should consult the regulator for advice.

677 A different outline planning zone may be proposed by the operator or the regulator. Where an operator believes that a default distance should be varied, they should consult the regulator who will provide guidance on calculating outline planning distances. The regulator and the Secretary of State may agree a different outline planning zone to that specified in the Schedule (regulation 9(2)), where agreement with both is not achieved the default distance will remain as Schedule 5.

678 For the purposes of this schedule only, power plants that were designed with the specific purpose of producing electricity on a commercial basis are included with the definition of nuclear "power plants", it does not include research or prototype reactors.

	679 For the purposes of this schedule, where a site is a nuclear licensed site within the meaning of the Nuclear Installations Act 1965 (as amended) [7], decommissioning and decommissioned are taken to mean the same. **Category 1 sites** 680 Category 1 sites are those sites involved in the processing or storage of significant quantities of high level waste and/or storing significant quantities of plutonium. **Category 2 and category 4 sites** 681 Sites in category 2 are operating nuclear power plants and decommissioning nuclear power plants with a presence of irradiated fuels. 682 A power plant that has verified that it is fuel free (it does not have a significant quantity of irradiated fuel on the site) can move from category 2 to category 4). Evidence of fuel free verification should form the basis of a written justification supporting this move. **Category 3 sites** 683 Category 3 sites are sites with a significant presence of enriched uranium or irradiated fuel and include those sites handling or storing bulk quantities of these materials. Category 3 sites do not include power plants. **Category 5 sites** 684 These sites are or have been involved in the production of radiopharmaceuticals, it includes decommissioning and decommissioned radiopharmaceutical sites 685 Although, no default outline planning zone is required under category 5, one may still be proposed by the operator (see paragraph 677).

Schedule 6 Information to be included in Emergency Plans
Regulations 10(3) and 11(3)

Schedule 6 Part 1	**Part 1** **Information to be included in an Operator's Emergency Plan**
Guidance Schedule 6 Part 1	686 This Part lists the minimum information to be included in the operator's emergency plan.
Schedule 6 Part 1 paragraphs 1(a) and (b)	*(1) The information referred to in regulation 10(3) is as follows—* *(a) the arrangements to set emergency procedures in motion;* (b) *the arrangements to co-ordinate the on-site mitigatory action;*
Guidance Part 1 paragraphs 1(a) and (b)	687 The plan should include the premises command structure for managing the response on the premises in accordance with the operator's emergency response arrangements. The plan should describe the activation process, including any declaration state definitions, and identify who has the authority for declaration of a radiation emergency (see regulation 17 on implementation of emergency plans). The arrangements should cover circumstances when senior managers are not available. It is recommended that the names or positions and roles, are included in the annexes of emergency plans, given that re-issue of an annex may be less burdensome than re-issue of the whole plan. Contact details should also be available

	but could be included in a supporting document to the plan.
Schedule 6 Part 1 paragraph 1(c)	*(c) the name or position of the person with responsibility for liaison with the local authority responsible for preparing the off-site emergency plan;*
Guidance Part 1 paragraph 1(c)	688 This is normally the person or position with responsibility for maintaining the operator's emergency plan. It is recommended that the names or positions and roles of authorised employees are included in the annexes of emergency plans, given that re-issue of an annex may be less burdensome than re-issue of the whole plan. Contact details should also be available but could be included in a supporting document to the plan.
Schedule 6 Part 1 paragraph 1(d)	*(d) for conditions or events which could be significant in bringing about a radiation emergency, a description of the action which should be taken to control the conditions or events and to limit their consequences, including a description of the safety equipment and resources available;*
Guidance Part 1 paragraph 1(d)	689 This is the principal component of the operator's emergency plan and must be drawn up in accordance with the principles and purposes of emergency plans set out in Schedule 7. The plan should cover the range of potential radiation emergencies and the degree of planning should be proportionate to the consequences and likelihood of an event occurring. 690 The plan should include: (a) identification of the range and grouping of events with the potential to cause a radiation emergency as identified by regulations 4 and 5; (b) the potential consequences of these events identified by the consequence assessment and the impact of any variable factors on the severity of the consequences (see regulation 10(2)); (c) the intended strategy for dealing with these events should they come about, including any relevant planning assumptions which have been made; (d) details of any supporting procedures and documents in place to support the operator's emergency plan; (e) details of the employees who have roles to play in the emergency response, and their responsibilities; (f) details of the facilities and communications equipment available to support the emergency response; (g) details of the availability and function of special emergency equipment including fire-fighting materials, and damage control and repair items; and (h) details of the availability and function of other resources. 691 See guidance to regulations 10(6), 10(7) and 10(8) for further guidance on the provision of information, instruction, training and equipment.
Schedule 6 Part 1 paragraph 1(e)	*(e) the arrangements for limiting the risks to persons on the premises including how warnings are to be given and the protective action persons are expected to take on receipt of a warning;*

Guidance Part 1 paragraph 1(e)	692 This should include the systems, equipment and facilities for early detection of a developing radiation emergency, the means of warning people working at the premises and the responsibilities for initiating the suitable responses by the operator's employees (e.g. to evacuate via planned evacuation routes, shelter, muster at planned muster points, use personal protective equipment, take stable iodine etc.). The action to be taken should be planned in accordance with the principles and purposes of emergency plans set out in Schedule 7. 693 This should also include the arrangements to secure, so far as is reasonably practicable, the restriction of exposure to ionising radiation and the health and safety of employees who have a role in responding to the emergency. 694 Regulations 10(6), 10(7) and 10(8) require the provision of information, instruction, training and equipment. This should ensure that persons on the premises are sufficiently informed in advance of the action they should take and have access to the equipment necessary to restrict their exposure.
Schedule 6 Part 1 paragraph 1(f)	*(f) the arrangements for providing early warning of the incident to the responder or responders identified in the local authority's off-site emergency plan to set the off-site emergency planning in motion, the type of information which should be contained in an initial warning and the arrangements for the provision of more detailed information as it becomes available;*
Guidance Part 1 paragraph 1(f)	695 The operator's emergency plan should establish the system for managing information in the event of a radiation emergency or an event which is likely to lead to a radiation emergency. This should ensure that necessary information can be identified and communicated to people at the premises, the local authority, the emergency services and other responding organisations requiring information. 696 This should include: (a) the operator's arrangements for alerting responding organisations (which by local agreement may be by an external body such as the police service) and when this should be done (see guidance on regulation 17). The operator should aim for initial notification to take place within 15 minutes of the declaration of the radiation emergency but in any case as soon as possible; and (b) the type of information that the local authority and responding organisations will require, before and during their response, in what form, to whom and by whom. For example, information on the nature and extent of the radiological hazard will be required by responding organisations to inform decisions on the off-site response, including whether a response should be triggered in the outline planning zone, where one exists. The initial notification could be made using a standard, pre-agreed format. 697 For radiation emergencies based on perceived risk, the plan should include the communication arrangements necessary to provide reassurance to members of the public and manage local concerns. This should include details of the operator's own communications response and the arrangements for providing information to the local authority and responding organisations so that they can provide consistent communications.
Schedule 6 Part 1 paragraph 1(g)	*(g) the arrangements for providing assistance to the local authority with its off-site protective action;*

Guidance Part 1 paragraph 1(g)	698 This should include, for example, details of: (a) any special equipment, expertise or facilities which have been identified for use as part of the off-site emergency plan, for example to assist with off-site monitoring; and (b) the role of the establishment's employees in briefing the media, including the use of media briefing facilities.
Schedule 6 Part 1 paragraph 1(h)	*(h) the arrangements for providing information about the incident to the Secretary of State and the regulator;*
Guidance Part 1 paragraph 1(h)	699 This should include the operator's arrangements (including who, what, how and when) for alerting the Secretary of State and the regulator and for providing updates during the response. The information provided to the regulator should include the information described in paragraph 458 relating to a representative range of source terms and a description of the event. The operator should provide such source terms in a form suitable for use in the UK national emergency response arrangements as noted in guidance supporting Regulation 4(7). The arrangements for providing this information should follow any relevant nationally agreed processes and formats; as described in NNEPRG [2].
Schedule 6 Part 1 paragraph 1(i)	*(i) the arrangements for providing information about the incident to the Scottish Government or the Welsh Ministers, if appropriate;*
Guidance Part 1 paragraph 1(i)	700 This should include the operator's arrangements (including who, what, how and when) for alerting the Scottish Government or Welsh Ministers if appropriate and for providing updates during the response.
Schedule 6 Part 1 paragraph 1(j)	*(j) the arrangements for dealing with emergency exposures including the dose levels which have been determined as appropriate for the purposes of putting into effect the emergency plan;*
Guidance Part 1 paragraph 1(j)	701 This should include: (a) the liaison arrangements with other employers (for example other employers on the premises and the emergency services) to reach agreement with the operator on the dose level(s) for the purposes of undertaking protective action (including mitigatory action) at the premises; (b) the different emergency exposure dose levels that may be required relevant to the radiation emergencies that may occur; and (c) the arrangements for managing emergency exposures during a radiation emergency to ensure compliance with the requirements of regulation 18(1).

Schedule 6 Part 1 paragraph 1(k)	*(k) the arrangements to prioritise keeping doses within the levels set out in regulation 20(1);*
Guidance Part 1 paragraph 1(k)	702 The plan should record the arrangements and the reference levels referred to in regulation 20(2).
Schedule 6 Part 1 paragraph 1(l)	*(l) any specific arrangements which take account of lessons learned from past emergency situations, whether at the operator's premises or otherwise;*
Guidance Part 1 paragraph 1(l)	703 When preparing the operator's emergency plan the operator should consider and apply where appropriate: (a) lessons from past emergency situations and incidents, whether at the operator's premises or otherwise, including any relevant learning from non-radiation emergency situations and international emergencies; (b) lessons from emergency exercises, whether at the operator's premises or otherwise, and at a national and international level; and (c) current knowledge or guidance concerning the response to emergencies, for example national or international best practice. 704 The operator's emergency plan should evolve as lessons are identified by taking them into account in the review of the emergency plan under regulation 12. Further guidance is available under regulation 12.
Schedule 6 Part 1 paragraph 1(m)	*(m) what protective action is proposed to be taken, and how far each such action extends within any detailed emergency planning zone; and*
Guidance Part 1 paragraph 1(m)	705 The operator's emergency plan should cover protective action for persons at the premises (see Schedule 6, Part 1 (e)). To ensure that both emergency plans dovetail, the operator's emergency plan should also refer to the same initial urgent protective action as the off-site emergency plan (e.g. sheltering, evacuation, stable iodine) (see Schedule 6, Part 2, Chapter 1 (f)). The operator's emergency plan should include details of the types of information that will be required to inform the decisions in the off-site response on further protective action to be taken (see Schedule 6, Part 1 (f)).
Schedule 6 Part 1 paragraphs 1(n) and (o)	*(n) the arrangements which the operator considers may assist in the transition from a radiation emergency to an existing exposure situation, including who will be involved in such transition , what information they are to receive ,and when.*
Guidance Part 1 paragraph 1(n)	706 These Regulations do not apply to existing exposure situations (see paragraph 7 for guidance on 'existing exposure situation' which is referred to as 'the recovery phase' below). Existing exposure situations are covered by the Radioactive Contaminated Land regime and other legislation, such as the Environmental Permitting (England and Wales)

	Regulations 2016 and the Environmental Authorisations (Scotland) Regulations 2018 for the management of radioactive wastes arising. However, under these Regulations arrangements must be made to assist in transitioning effectively to the recovery phase. 707 Decisions made in the response phase may impact the ability to deliver recovery successfully. Therefore, planning for the recovery phase should begin at the earliest opportunity following the onset of an emergency and run alongside the response to the emergency. Off-site, the handover of coordination from the response phase to the recovery phase should take place when pre-agreed criteria have been met. The operator should provide the necessary information to help responding organisations determine whether such criteria have been met. 708 The arrangements should include: (a) the types of information required to inform the decision of whether to transition from the response phase to the recovery phase. Criterion on which to make the decision include, for example: information on whether the incident has been contained within the premises and is stable, confirmation that the source of the exposure is sufficiently characterised, radiological monitoring data etc.; (b) any other information which will assist the transition and which is required by responding organisations to inform decisions; and (c) for the above points, identification of who should receive such information (this would usually be the local authority) and how it will be effectively communicated to them. 709 IAEA General Safety Guide No. GSG-11 [43], NNEPRG Recovery guidance documents [2], Cabinet Office guidance on Emergency Response and Recovery [37] and Preparing Scotland: Scottish Guidance on Resilience [44], set out further guidance on transition from the response to recovery phase.
Schedule 6 Part 2	**Part 2** **Information to be included in the off-site emergency plan**
Guidance Schedule 6 Part 2	710 This Part lists the minimum information to be included in the off-site emergency plan. 711 The off-site emergency plan is an integrated emergency management plan that brings together the emergency arrangements of all the responding organisations with a role in the response to a radiation emergency. It should provide a framework for the management, coordination and control of the off-site response within which responding organisations can work effectively together to mitigate the consequences of a radiation emergency so far as is reasonably practicable. 712 Protective action that would be taken by the operator to prevent radiation emergencies or to limit their consequences can be reflected in the degree of planning that is undertaken. The planning should be proportionate to the consequences and likelihood of an event occurring and may also take into account existing arrangements. 713 The off-site emergency plan should provide supporting information to assist the response. This includes relevant information about population demographics (e.g. locations and sizes of schools, hospitals, care homes, vulnerable groups), identification of critical infrastructure (e.g. transportation links, utilities, communications) and an assessment of where regional (e.g. a neighbouring local authority) or national support would be needed and how that could be requested. 714 The local authority's own emergency response arrangements dealing with the welfare of the local population (including, for example, the provision of food and shelter)

will be one of the detailed documents supporting the off-site emergency plan.

715 The local authority's off-site emergency plan should take into account variable factors so far as reasonably practicable, so it is effective in all situations. For example, the plan should allow for the provision of possible reductions in staffing levels or closure of facilities during weekends, public holidays etc. This is to ensure the plan considers and plans for those situations when routine staffing levels may not be available. The local authority should consider situations where members of the public do not follow advice or take self-initiated protective action and where possible consider the impact on the plan and appropriate mitigation. For example, in the communications plan.

Detailed and Outline Planning

716 Off-site emergency planning should be undertaken as follows:

(a) where there is a detailed emergency planning zone this is the area in which planning should incorporate the strategic, tactical and operational arrangements necessary to implement required protective action without undue delay based on pre-defined conditional criteria. Detailed emergency planning aims to implement urgent protective action within a few hours to mitigate the potential impact of radiation emergencies. Urgent protective action will provide time for responders to understand the consequences of the incident and to adjust subsequent protective action, such as increasing the scale of action taken and focusing those on areas at actual risk;

(b) where there is an outline planning zone this is the area in which strategic level, outline planning should be undertaken to support the decision making of emergency responders in the event that detailed planning (where this exists) or generic arrangements are not sufficient to respond to very low probability events that are potentially not considered in the design. Outline planning is about identifying where capabilities could be obtained from and how decisions on protective action would be made. It does not aim to implement protective action immediately, although there still should be a timely response. It is proportionately less detailed and less onerous than detailed planning; and

(c) outline planning will generally happen in the outline planning zone and detailed planning will happen in the detailed emergency planning zone. Nonetheless, there may be pockets of detailed planning inside the outline planning zone where local circumstances make it proportionate to put these in place (see paragraph 762-764). Outline planning may also be undertaken in the detailed emergency planning zone where protective action may not be required, except in the event of more severe radiation emergencies.

717 Prior information requirements also differ between the detailed emergency planning zone and the outline planning zone. See regulation 21 for further guidance.

718 The table below summarises the distinctions between detailed and outline planning.

	Outcome	**Achieving the outcome**
Detailed Planning	Ensures response capabilities (and the necessary action to deploy them): • can be implemented at speed; and • can be implemented automatically or with little (emergency-phase) decision-making processes.	Achieves these outcomes by describing the: • activation; • deployment; • management; and • sustainment of emergency response capabilities/action. Response capabilities and their

			supporting action are pre-agreed between local planners in advance. Capabilities are maintained, regularly tested and ready to deploy without delay when needed.
	Outline Planning	Identifies, at a strategic level, the necessary response capabilities/action, including where they would be obtained from and how they would be implemented. Response capabilities (and the necessary action to deploy them), should: • be available in longer time than detailed planning, after the emergency is declared in most cases; and • be implemented in a timely manner if considered necessary.	Achieves these outcomes by describing the: • decision points; • escalation routes; and • crucial information/ intelligence sources that allow implementation of these response capabilities/action. Written plans set out what emergency responders will do in broad terms. Response capabilities do not need to be in place, maintained and ready for immediate deployment.

Schedule 6 Part 2 Chapter 1 paragraphs 2(a) and (b)	***CHAPTER 1*** ***Information about detailed emergency planning zones*** *(2) The information referred to in regulation 11(3)(a) is as follows—* *(a) the arrangements to set emergency procedures in motion;* *(b) the arrangements to co-ordinate the off-site protective action;*
Guidance Part 2 Chapter 1 paragraphs 2(a) and (b)	719 This should include the management structure for organising and managing the off-site response in the event of a radiation emergency. The responding organisations should strive to work together as a team to maximise the effectiveness of the response to an emergency, and the response should be co-ordinated and have common basic objectives. 720 The plan should describe the activation process and the agreed multi-organisation coordination arrangements for the off-site emergency response. 721 There will be times when the senior managers are not available and appropriate arrangements should be included for these circumstances. It is recommended that the names or positions and roles of authorised employees are included in the annexes of emergency plans, given that re-issue of an annex may be less burdensome than re-issue of the whole plan. Contact details should also be available but could be included in a supporting document to the plan.

Schedule 6 Part 2 Chapter 1 paragraph 2(c)	*(c) the arrangements for receiving early warning of incidents, and alert and call-out procedures;*
Guidance Part 2 Chapter 1 paragraph 2(c)	722 The off-site emergency plan should include details of: (a) how a warning of a developing or actual radiation emergency will be received by the local authority and off-site emergency services. For further guidance on communications between the operator, local authority and other responding organisations see the guidance to regulation 13(1)(b) and (c); and (b) who should be alerted (this should include the other responding organisations involved, or likely to be involved, in the response to a radiation emergency) and how the warning will be cascaded, as necessary, to those organisations (see guidance paragraphs 454 and 455 on regulation 17).
Schedule 6 Part 2 Chapter 1 paragraph 2(d)	*(d) the arrangements for co-ordinating resources necessary to implement the off-site emergency plan;*
Guidance Part 2 Chapter 1 paragraph 2(d)	723 Detailed planning should describe the activation, deployment, management and sustainment of specific emergency response capabilities needed to provide a response at any time, without delay. In the detailed emergency planning zone it may be necessary to pre-deploy equipment, people, and other resources, as part of developing the emergency plan to ensure that the detailed emergency response can be swiftly enacted at any time of day in the event of an emergency. Planning should draw on national emergency planning where appropriate to ensure that the response can be sustained and any additional national resources needed to manage the consequences of the emergency are quickly brought into play. 724 Information should be included in the off-site emergency plan on how and on what timeframe the resources identified in the response arrangements will be mobilised and how the action of the responding organisations will be co-ordinated. This information should complement and support the information required in the previous parts. The information should include: (a) which responding organisations have a role to play in the emergency response, and their roles and responsibilities; (b) how each responding organisation will be alerted and will put their emergency arrangements into action; (c) how emergency responders from the premises and the emergency services will recognise each other at the scene; (d) how emergency responders from the responding organisations and premises will communicate to obtain and transmit information needed for decision making, in accordance with their agreed roles and responsibilities, including details of the facilities and communications equipment available to support the emergency response; (e) the location where the emergency services, emergency responders from the premises and other responding organisations will rendezvous off-site, if necessary; and

	(f) how emergency responders from the responding organisations will gain access to the premises, to any special equipment or to any other resources which may be required in the response.
Schedule 6 Part 2 Chapter 1 paragraph 2(e)	*(e) the arrangements for providing assistance to the operator with on-site mitigatory action;*
Guidance Part 2 Chapter 1 paragraph 2(e)	725 Emergency workers who may be involved with the operator's emergency plan must also be provided with information, instruction, training and equipment under regulations 10(7) and 10(8) which will include those responding organisations providing assistance to the operator with on-site mitigatory action. 726 The off-site emergency plan should include details of: (a) the type of events identified with the potential to cause a radiation emergency; (b) the intended strategy for dealing with these events on the premises should they come about; (c) details of the employees/organisations who have roles to play in the response at the premises, and their responsibilities; (d) arrangements for briefing emergency responders arriving at the premises; (e) details of the availability and function of special equipment including fire-fighting materials, damage control and repair items; and (f) details of the availability and function of other resources.
Schedule 6 Part 2 Chapter 1 paragraph 2(f)	*(f) the arrangements for off-site protective action;*
Guidance Part 2 Chapter 1 paragraph 2(f)	727 These arrangements are about mitigating the off-site effects of radiation emergencies and should be developed on the basis of the content of the consequences report (see regulation 7). 728 Off-site protective action should, as appropriate, include, for example: (a) sheltering members of the public; (b) evacuating members of the public; (c) administration of stable iodine tablets to members of the public; (d) preventing people entering the affected area; (e) controlling traffic (including road, rail, marine and aviation) to minimise unnecessary contamination of cargo and vehicles and control movement, for example maintaining essential emergency services' routes; (f) food, feed and water restrictions; (g) protection of property, for example closing ventilation to minimise contamination

	of outdoor spaces, goods etc.; and (h) any other action concerning protection of members of the public, for example restrictions on outdoor activities. 729 For (a) to (d), the off-site emergency plan should set down the conditions under which urgent protective action should be considered to ensure that they are enacted promptly when needed and how they will be implemented. Protection strategies require a balance to be struck between the expected benefits and detriments of introducing particular protective action so that the margin of benefit over detriment is maximised. ERLs are recommended by PHE for planning emergency urgent protective action (sheltering, evacuation and stable iodine). ERLs consider the balance between the benefit from reducing the dose against the other consequences of implementing urgent protective action (i.e. wider health risks (including psychological impact); consequential injuries; economic consequences; social and environmental factors). PHE's document on Public Health Protection in Radiation Emergencies provides further guidance on protective action and ERLs [27]. 730 World Health Organization guidance [41] sets out iodine thyroid blocking guidelines for use in planning for and responding to radiological and nuclear emergencies. These guidelines may inform planning for stable iodine administration, noting national legislation (the Human Medicines Regulations [45]). 731 Actions (e) to (h) may not be considered for immediate implementation (although urgent protective action may result in some of these) but consideration should be given at the planning stage of whether such action may be required in a radiation emergency, how the decision would be made to implement them and how this would be achieved. The decision of whether to take action would need to consider the overall potential benefit of the action proposed together with the possible detriment associated with them. Similarly, such action may impact on other, potentially much more beneficial, urgent protective action and reduction in their benefit should be avoided. 732 The principles and purposes of emergency plans (see Schedule 7) must be taken into account when planning off-site mitigatory action.
Schedule 6 Part 2 Chapter 1 paragraph 2(g)	*(g) the arrangements for providing the public with specific information relating to the emergency and the response or responses recommended to the public as a whole or parts of it as a result of the emergency;*
Guidance Part 2 Chapter 1 paragraph 2(g)	733 The off-site emergency plan should include information on: (a) how the local population will be alerted in the event of a radiation emergency; (b) how they will be informed of what they should do; and (c) how they will be informed that the danger is passed and they may return to their normal activities. 734 This will refer to the prior information that will have been supplied to members of the public in the detailed emergency planning zone (see regulation 21) and the supply of information to the public in the event of a radiation emergency (see regulation 22). The methods available to deliver urgent information to members of the public are varied and some may depend on the availability of power supplies or telephone lines so a variety of channels should be available. The public may be warned by an audible alarm or siren where available, telephone or some other system; the methods and arrangements for warning and informing the public should be recorded in the emergency plan.

	735 The prior information should inform the local population about the warning mechanism, for example the meanings of different alarms and sirens. It should be noted that prior warning is not always possible. 736 For radiation emergencies based on perceived risk, the plan should include the communication arrangements necessary to provide reassurance to members of the public and manage local concerns. This should include details of how the local authority will receive information from the operator on the situation and the arrangements for the local authority and responding organisations to provide consistent communications to members of the public.
Schedule 6 Part 2 Chapter 1 paragraph 2(h)	*(h) the arrangements for dealing with emergency exposures including the dose levels which have been determined as appropriate for the purposes of putting into effect the emergency plan;*
Guidance Part 2 Chapter 1 paragraph 2(h)	737 This should include: (a) the liaison arrangements with other employers (for example, emergency services) to reach agreement with the operator on the dose level(s) for the purposes of undertaking off-site protective action; (b) the different emergency exposure dose levels that may be required relevant to the radiation emergencies that may occur; and (c) the arrangements for managing emergency exposures during a radiation emergency to ensure compliance with the requirements of regulation 18(1).
Schedule 6 Part 2 Chapter 1 paragraphs 2(i) and (j)	*(i) the arrangements to prioritise keeping doses within the levels set out at regulation 20(1);*
Guidance Part 2 Chapter 1 paragraph 2(i)	738 The plan should record the arrangements and the reference levels referred to in regulation 20(2).
Schedule 6 Part 2 Chapter 1 paragraph 2(j)	*(j) any specific arrangements which take account of lessons learned from past emergency situations, whether at the operator's premises or otherwise;*
Guidance Part 2 Chapter 1 paragraph 2(j)	739 When preparing the off-site emergency plan the local authority should consider and apply where appropriate: (a) lessons from past emergency situations and incidents, whether at the premises covered by the off-site emergency plan or otherwise, including any relevant learning from non-radiation emergency situations and international emergencies;

	(b) lessons from emergency exercises whether at the premises covered by the off-site emergency plan, or otherwise, and at a national and international level; and (c) current knowledge or guidance concerning the response to emergencies, for example national or international best practice. 740 The off-site emergency plan should evolve as lessons are identified by taking them into account in the review of the emergency plan under regulation 12. Further guidance is available under regulation 12.
Schedule 6 Part 2 Chapter 1 paragraph 2(k)	*(k) the arrangements for carrying out an assessment of the impacts of the radiation; and*
Guidance Part 2 Chapter 1 paragraph 2(k)	741 The off-site emergency plan should include information on the arrangements for determining the nature and impact of the radiological hazard. This is necessary to ensure that the plan is capable of responding to the particular characteristics of a radiation emergency as those characteristics emerge. There are wider impacts associated with radiation emergencies, for example psychological impact, which should be considered as part of protection strategies (see Schedule 7, Part 1). The purpose of the assessment of the radiological hazard is: (a) to inform activities associated with the immediate safety of people, including decisions on urgent protection action and provision of public reassurance; (b) to establish environmental impact; and (c) to determine food restrictions if required. 742 Environmental monitoring should be conducted to quickly confirm any release of radiation and then to subsequently determine the nature and extent of any contamination. Ground based sampling activities can identify the geographical spread of radiation. 743 Automated radiation detection systems may be in place in and around the premises and can provide immediate indications of abnormal radiation levels. These systems form part of a nationwide network of detectors which would trigger in the event of an overseas nuclear emergency. They would also be used to support the response to radiation emergencies by providing the facilities necessary to assemble, analyse and interpret the various forms of radiological monitoring data that would be needed to establish the effects of such an emergency in the UK. 744 Where relevant, to further inform the off-site response, plans should include arrangements for receiving from central Government the outcomes of national capabilities used to assess the impacts of the radiation; as described in NNEPRG [2]. 745 Arrangements may include establishing a public health monitoring facility (Radiation Monitoring Units) to monitor members of the public who have been evacuated or to provide reassurance to people who may have been in close proximity to the premises. 746 The arrangements should include details of how information will be shared promptly, consistently and accurately between organisations and details of how data will be interpreted so that assessments can utilise cross-organisation collaboration to synthesise the wide range of available expertise, roles and information sources to produce consolidated and informed judgements.

Schedule 6 Part 2 Chapter 1 paragraph 2(l)

(l) the arrangements which the local authority considers necessary in the transition from a radiation emergency to an existing exposure situation, including who will be involved in such a transition and what information they are to receive.

Guidance Part 2 Chapter 1 paragraph 2(l)

747 These Regulations do not apply to existing exposure situations (see paragraph 7 for guidance on 'existing exposure situation' which is referred to as 'the recovery phase' below). Existing exposure situations are covered by the Radioactive Contaminated Land regime and other legislation, such as the Environmental Permitting (England and Wales) Regulations 2016 and the Environmental Authorisations (Scotland) Regulations 2018 for the management of radioactive wastes arising. However, under these Regulations arrangements must be made to assist in transitioning effectively to the recovery phase.

748 Decisions made in the response phase may impact the ability to deliver recovery successfully. Therefore, planning for the recovery phase should begin at the earliest opportunity following the onset of an emergency and run alongside the response to the emergency. The handover of coordination from the response phase to the recovery phase should take place when pre-agreed criteria have been met.

749 The arrangements should include:

(a) the activities which should be completed to plan for recovery during the response phase, for example, development of a recovery strategy;

(b) the process for handover of coordination from the response phase to the recovery phase, including the criteria to assess readiness for handover which should be confirmed early on in the response phase (criteria may include, for example, whether the incident has been contained in the premises and is stable and whether any urgent protective action has been lifted);

(c) the types of information that should be handed over (for example, an impact assessment and information collated as part of the response phase such as a report on the status of all emergency phase action and outstanding issues) and how this will be effectively handed over to those responsible for coordinating recovery; and

(d) communications to other responding organisations and the community about the handover.

750 IAEA General Safety Guide No. GSG-11 [43], NNEPRG Recovery guidance documents [2], Cabinet Office guidance on Emergency Response and Recovery [37] and Preparing Scotland: Scottish Guidance on Resilience [44], set out further guidance on transition from the response to recovery phase.

Guidance Schedule 6 Part 2 Chapter 2

CHAPTER 2

Information about outline planning zones

751 There is no difference in the types of response activity that will be planned for under both detailed and outline planning. However, the level of planning will differ. The table below sets out some illustrative examples to demonstrate the difference between detailed and outline planning.

Capability	Detailed Planning	Outline Planning
Evacuation by bus	• Local planners know how many buses they can rely on for an immediate response, where	• Local planners know approximately how many buses might be available and when,

	the buses will go and what they will do. • This is agreed between the local authority and private bus companies. • There are operating procedures setting out what drivers should do. • Drivers are briefed.	recognising that this is not guaranteed. • Local planners know how to mobilise the buses and understand that they need to instruct the company what to do (based on the prevailing circumstances of the emergency), as this would not have been pre-agreed. • Although these plans are written down, the arrangements are not formalised.
Demographic Assessment	• Population in the detailed emergency planning zone has been identified in detail to show number of residents, specific vulnerable groups such as schools or care homes (with staff and pupils or people in care numbers) and where transitory groups are, for example caravan sites or bird sanctuaries. • This has been mapped to identifiable sectors. • Each vulnerable group has an identified point of contact and has been visited by planners to explain nuclear emergency arrangements. • Specific advice for vulnerable groups has been developed and issued.	• Population has been quantified in larger sectors and vulnerable locations mapped. • No contact has been made with vulnerable groups nor have they been provided with specific advice. • This information contributes to the understanding of potential impact on the population.
Transport Access Management	• Affected rail links identified in the plan with communication protocols agreed with the rail operator in case of an emergency and included in the off-site emergency plan. • Road blocks preventing access to the detailed emergency planning zone identified and available on maps in the off-site emergency plan – equipment, employees and timeline identified for establishing and maintaining the road blocks.	• Potentially affected rail links identified on a map in the outline planning zone and contact number for the organisation maintained in the off-site emergency plan. • Contact number and arrangements for mobilising road blocks maintained in the off-site emergency plan.

752 Where there is a detailed emergency planning zone, any outline planning in the off-site emergency plan should set out how the arrangements covered in Schedule 6, Part 2, Chapter 1 could be extended to cover the geographical area of the outline planning zone, where appropriate. This should be done by describing the decision points and escalation

	routes to make timely decisions on the expansion of response capabilities into parts or all of the outline planning zone.
Schedule 6 Part 2 Chapter 2 paragraph 3(a)	*3. The information referred to in regulation 11(3)(b) is as follows—* *(a) where there is no detailed emergency planning zone, the information set out at paragraph 2; and*
Guidance Part 2 Chapter 2 paragraph 3(a)	753 Where a premises requires an outline planning zone only the information in Schedule 6, Part 2, Chapter 1 must be included in the off-site emergency plan for that outline planning zone. However, the degree of planning should be proportionate, in line with the guidance set out below. Outline planning should be proportionate to the consequences and likelihood of an event occurring and can utilise and build on the knowledge and learning derived from any previous assessments of the extendibility of plans. 754 Outline planning should identify, at the strategic level, what capabilities may be required, where they could be obtained from and how they could be implemented. Unlike detailed planning, it is not necessary to have those capabilities in place, maintained and ready for immediate deployment. Arrangements for these would be developed following a radiation emergency and after having confirmed the scale and nature of the radiation emergency. If the local authority considers that additional resources may be required for the outline planning arrangements, they should discuss this with the operator and relevant responding organisations to confirm their proportionality before considering inclusion in the off-site emergency plan. 755 For non-nuclear premises, local authorities should consider the generic emergency planning arrangements already in place (for flooding, chemical releases etc.) to decide if these are sufficient to deal with the consequences of a radiation emergency set out in the consequences report or if these are the basis from which additional outline planning needs to be undertaken. For example an additional reactive communications plan for radiological events may be required for a non-nuclear premises. 756 Some elements of detailed planning may be required in the outline planning zone (for further guidance on detailed planning in outline planning zones see paragraph 762-764). 757 Outline emergency planning arrangements should be uniform across the outline planning zone. 758 In relation to the outline planning zone, the off-site emergency plan should include: (a) relevant information about population demographics (see table above); (b) information to assist in the implementation of protective action (see examples in the table above) and how the decision to implement protective action would be made; (c) prepared information that could be provided to members of the public in the outline planning zone and how this would be provided (this will refer to the prior information that will have been made available to members of the public in the outline planning zone (see regulation 21) and the supply of information to the public in the event of a radiation emergency (see regulation 22)); and (d) when regional (e.g. a neighbouring local authority) or national support would be needed and how that could be requested (see regulation 14 on co-operation between local authorities).

Schedule 6 Part 2 Chapter 2 paragraph 3(b)(i)	*(b) in all cases—* *(i) at what stage and how the response to a radiation emergency triggers a response within the outline planning zone; and*
Guidance Part 2 Chapter 2 paragraph 3(b)(i)	759 A response in the outline planning zone may be triggered when a low probability event potentially not considered in the design occurs or where the potential increased scale and nature of a radiological hazard has been confirmed during the response, meaning that a radiation emergency is likely to affect the outline planning zone. 760 For premises where there is an outline planning zone the off-site emergency plan should include arrangements for triggering a response in the outline planning zone and extending the arrangements of the detailed emergency planning zone where one exists. 761 In the event of radiation emergency, or an event which might lead to a radiation emergency, in the outline planning zone the parts of the off-site emergency plan relating to outline planning should be implemented, where appropriate. When the operator informs the local authority that it has put its plan into effect under regulation 17(2), the operator needs to provide information on whether the radiation emergency extends to the outline planning zone. In an escalating situation, a response in a detailed emergency planning zone (where one exists) may need to be extended to the outline planning zone and arrangements should ensure that there is swift communication of such information between the operator and the local authority and responding organisations (see regulations 13(1) (b) and (c)).
Schedule 6 Part 2 Chapter 2 paragraphs 3(b)(ii) and 4	*(ii) whether there are any areas of detailed planning within the outline planning zone and, if so, the detailed planning arrangements in respect of any such area.* *4. In paragraph 3(b)(ii), an area of detailed planning within the outline planning zone means an area within which a greater degree of planning is necessary as a result of the existence of particular factors such as schools or hospitals within that area.*
Guidance Part 2 Chapter 2 paragraphs 3(b)(ii) and 4	762 The local authority should identify any areas, or pockets, in the outline planning zone where detailed planning is considered necessary for vulnerable groups, such as schools or hospitals, located adjacent to the boundary of the detailed emergency planning zone. 763 A proportionate and graded approach should be taken in the identification of detailed planning pockets based on the consequences and likelihood of a radiation emergency in the outline planning zone, the distance from the premises or the detailed emergency planning zone, and optimisation of protection (see Schedule 7, Part 1, paragraph 1(d)). Where inclusion of a vulnerable group close to the boundary of the detailed emergency planning area would create an excessively large area, these vulnerable groups should be included as discrete additional detailed emergency planning areas. However, it is not necessary to consider all vulnerable groups in outline planning areas to be pockets of detailed emergency planning. 764 Pockets of detailed planning should be considered as part of the detailed emergency planning zone and the requirements of Schedule 6, Part 2, Chapter 1 must be applied. Identification of such pockets should take place when the detailed emergency planning zone is determined in accordance with regulation 8.
Schedule 6 Part Chapter 3 paragraph 5(a)	*CHAPTER 3* *Information which an off-site emergency plan must contain* *(5) In order to comply with regulation 11(3)(c) an off-site emergency plan must—* *(a) set out the extent of the detailed emergency planning zone (if any) and the outline planning zone (if any);*

Guidance Part 2 Chapter 3 paragraph 5(a)	765 This should describe the size and shape of the detailed emergency planning zone and/or the outline planning zone. This should take the form of a map showing the boundaries of the area(s) and may be accompanied by a general description of the area(s) to aid understanding.
Schedule 6 Part 2 Chapter 3 paragraph 5(b)(c)	*(b) in respect of the detailed emergency planning zone, set out—* *(i) the severity of the consequences in terms of dose quantity;* *(ii) the extent to which the consequences can be mitigated by timely action;* *(c) set out how the off-site emergency plan aims to mitigate the consequence of an emergency, in response to the factors listed at (b); and*
Guidance Part 2 Chapter 3 paragraphs 5(b) and (c)	766 The information required by 5 (b)(i) should be provided by the operator. The arrangements set out in the off-site emergency plan should take this information into account along with any other relevant information provided by the operator such as recommended distances for urgent protective action together with timescales for their implementation and details of the environmental pathways at risk, including the need for any likely food and water restrictions (see Schedule 4). 767 The local authority should set out in its off-site emergency plan how the consequences of a radiation emergency will be mitigated. To achieve this, the local authority needs to draw on its own emergency planning expertise together with the expertise of other responding organisations. PHE's document on Public Health Protection in Radiation Emergencies [27] provides further guidance on protective action and associated effectiveness.
Schedule 6 Part 2 Chapter 3 paragraph 5(d)	*(d) set out the process for determining when the site and the surrounding area is no longer in an emergency state.*
Guidance Part 2 Chapter 3 paragraph 5(d)	768 See guidance on Schedule 6, Part 2, Chapter 1, paragraph 2(l).

Schedule 7 Principles and purposes of emergency plans

Regulations 10(3) and 11(3)

Schedule 7 Part 1 paragraph 1(a) and (d)	***PART 1*** ***Principles to which emergency plans must have regard*** *(1) The person with responsibility for preparing an emergency plan under these Regulations must consider the following principles when preparing that plan—* *(a) the necessity for the plan to respond to the particular characteristics of a given radiation emergency as those characteristics emerge;* *(b) the necessity to optimise protection strategies to ensure that the proposed*

	response, as a whole, is predicted to do more to mitigate the radiation emergency and facilitate transition from that emergency than to increase its duration or consequence, taking into account— *(i) the health risks arising from exposure to ionising radiation as a result of the radiation emergency, in both the long and the short term;* *(ii) the economic consequences of the radiation emergency;* *(iii) the effects of the disruption, both on the premises and the area immediately surrounding it, and on the public perception of the effects of the radiation emergency;* *(c) the necessity of avoiding, so far as possible, the occurrence of serious physical injury to any person or persons;* *(d) the necessity of ensuring that an appropriate balance is struck between the expected harms and benefits of any particular protective action so as to maximise the benefit of that action.*
Guidance Part 1 paragraphs 1(a) and (d)	769 The operator should have arrangements in place to promptly assess and anticipate the characteristics of the specific radiation emergency which has occurred to respond accordingly. Such characteristics include, for example, the origin, extent and probable development of the radiation emergency. The off-site emergency plan must also enable a response to the particular characteristics of a radiation emergency as they emerge. An effective system for managing information between the operator and the local authority and responding organisations in the event of a radiation emergency will help in achieving this. 770 Advice on protective action is provided by PHE, who is responsible for advising UK government bodies on radiation protection of the public. PHE's document on Public Health Protection in Radiation Emergencies [27] provides further guidance on the principles of radiation protection for radiation emergencies, protective action and ERLs. 771 Protection strategies should be optimised and require a balance to be struck between the expected benefits and detriments of introducing particular protective actions, so that the margin of benefit over detriment is maximised. This applies to all consequences of implementing protective action, including radiation health risks, wider health risks (including psychological impact); consequential injuries; economic consequences; social and environmental factors. The aim is that the implemented strategy should provide the best outcome possible for the affected population, taking account of all the wider consequences. 772 Economic consequences (e.g. costs involved for the local population if they need to be evacuated or environmental harm resulting from a particular protection strategy) should be taken into account as part of the detriment. Remedial measures can affect the radioactive waste arising from a radiation emergency and handling such waste may also contribute to costs. 773 Wider health risks associated with a radiation emergency include psychological impact and this should also be taken into account when considering the detriment associated with particular protection strategies. To minimise this type of health impact, plans need to prioritise the provision of timely and credible information and support its delivery over a potentially wide area. It needs to be recognised that people in areas unaffected physically by any radiation release and at considerable distances from the premises may be as susceptible to this type of psychological health impact as the local population. 774 In relation to urgent protective action PHE's ERLs consider the balance between the benefit from reducing the dose against the other consequences of implementing the

	protective action. During planning, the ERLs provide guidance on where this balance lies for urgent protective action.
Schedule 7 Part 2 paragraph 2(a)	***PART 2*** ***Purposes of emergency plans*** *(2) The person with responsibility for preparing an emergency plan under these Regulations must ensure that the plan fulfils the following purposes—* *(a) to reduce or stop the effects of the radiation emergency;*
Guidance Part 2 paragraph 2(a)	775 The operator has a key role in reducing or stopping the release of radiation or radioactive substances from the premises. The operator's emergency plan should describe the measures and arrangements to do this. 776 Where responding organisations (e.g. the fire and rescue service) have a role to play in reducing or stopping the release of radiation or radioactive substances from the premises, the off-site emergency plan should describe the arrangements for providing assistance to the operator.
Schedule 7 Part 2 paragraphs 2(b) and (c)	*(b) to reduce the exposure to individuals and to the environment resulting from the release of ionising radiation;* *(c) if necessary, to ensure that provision is made for the medical treatment of those affected by the radiation emergency; and*
Guidance Part 2 paragraphs 2(b) and (c)	777 The operator's emergency plan should describe arrangements to restrict the exposure of employees and others on the premises in the event of a radiation emergency. It should also describe how responding organisations will be advised of the nature, quantity and geographical extent of the release so that those organisations can take steps to restrict the exposure of members of the public from radioactive substances in the environment and/or provide medical treatment as necessary. 778 The off-site emergency plan should describe arrangements to restrict the exposure of emergency responders and members of the public outside the premises. These steps may include, for example, the provision of advice on sheltering or evacuation. Responding organisations also have a key role in reducing the transfer of radioactive substances to individuals from the environment. The operator can advise on the nature, quantity and geographical extent of the release so that those organisations can take steps to restrict the exposure of members of the public from radioactive substances in the environment and / or provide medical treatment as necessary. Steps taken to restrict exposure may include, for example, the production of advice to restrict the consumption of certain foodstuffs or restrict particular water supplies. This advice would be provided by the responsible organisation, for example, Food Standards Agency / Food Standards Scotland is responsible for ensuring food safety in the event of a radiation emergency. The off-site emergency plan should describe the arrangements for initiating and implementing the food safety response. PHE's document on Public Health Protection in Radiation Emergencies provides further guidance on Maximum Permitted Levels in food and action levels in drinking water. 779 Fulfilling the purpose set out in part (a) will help to reduce exposure to the environment and steps taken to protect human health can also provide protection for the environment. 780 Plans should describe the arrangements for accessing medical treatment. The medical treatment is relevant to both on and off-site casualties. This will require discussion with the relevant health authority as part of the consultation required by regulations 10(5) and

	11(5).
Schedule 7 Part 2 paragraph 2(d)	*d) to prioritise the implementation of the plan in relation to a person exposed to a dose consequence in excess of the reference levels set out in regulation 20.*
Guidance Part 2 paragraph 2(d)	781 See regulation 20 for further guidance.

Schedule 8 Prior information to be supplied and made publicly available

Regulation 21(1)

Guidance Schedule 8

782 The purpose of this Schedule is to set out the minimum content that the prior information requires in regulation 21.

783 Prior information is intended to give the local population a clear understanding of the action that they may be asked to take in a radiation emergency. If an event was to occure this would allow the necessary protective action to be implemented smoothly and speedily. Information should be drafted and presented with absolute clarity so it creates understanding and awareness, and avoids causing alarm.

784 When deciding what type of information to publish, local authorities should consider the following points:

(a) how the public will receive the information. This will differ between the detailed emergency planning zone and outline planning zone (see ACOP paragraphs 546 -547) and consideration should be given to who the target audience is and their information needs. Public information materials should be accessible and available in a range of formats;

(b) how to ensure it will be easily understood by members of the public. Information should be factual and accurate and provided in clear and comprehensible language. Care should be taken to consider the needs of vulnerable people or those who may not understand the messages (such as children in schools). Excessive use of technical information or jargon may be difficult for people to read and absorb quickly, which can in turn lead to confusion and uncertainty about what they need to know or what action they should take. The use of maps and illustrations can be a particularly effective way of putting over the required information; and

(c) whether action is to be taken by members of the public. The key messages of the information should be considered and the information should communicate clearly the action that members of the public should take.

785 Prior information should also include:

(a) whether any additional and more detailed information has been made publicly available (by the local authority or other organisations) and if so, where it can be

	found; and (b) the date of publication of the prior information and its period of validity (which should not exceed three years).
Schedule 8 Part 1 paragraph 1	*PART 1* *Information in relation to detailed emergency planning zones* *(1) Basic facts about ionising radiation and its effects on persons and on the environment.*
Guidance Part 1 paragraph 1	786 The facts about radioactivity should introduce the reader to basic concepts, such as radiation dose, quantities and units. An explanation of background radiation and doses from background radiation may also be helpful. The explanation on the effects of radioactivity should highlight the difference between internal and external radiation, the exposure pathways for humans, including through contaminated food and drink, and the short- and long-term effects of exposure and how these are affected by the level of dose. 787 This information is not premises-specific and should not change significantly with time. So, it would be permissible for this purpose to use a suitable leaflet or booklet produced by another organisation, for instance PHE. However, it should still be distributed at the same time as and associated with the other information.
Schedule 8 Part 1 paragraph 2	*(2) The various types of radiation emergency identified and their consequences for the general public and the environment.*
Guidance Part 1 paragraph 2	788 The information provided should describe in terms comprehensible to the reader the work activity and event(s) which may give rise to a radiation emergency, and the likelihood of such an emergency occurring. How such emergencies can affect people and the environment (for example through dispersion and settling of radioactive dust) should then be explained. The role of the weather and particularly the effect of wind direction should also be explained in terms of its consequences for exposure and causing contamination, and how rapidly this would occur.
Schedule 8 Part 1 paragraph 3	*(3) Protective action envisaged to alert, protect and assist the general public in the event of a radiation emergency.*
Guidance Part 1 paragraph 3	789 The information provided should specify how people will be initially alerted to the existence of a radiation emergency which might affect them. How they can continue to keep themselves informed on the development of events should also be stated. This is normally achieved by tuning to a local radio or television station with whom prior agreement has been reached to perform this role (such an agreement should form part of the arrangements that local authorities are required to prepare under regulation 22). The information should also advise which websites, social media accounts and any other communciation channels will be updated during a radiation emeregency. 790 There should then be a general description of the off-site emergency plan as it concerns the protection of members of the public, including any links to the off-site emergency plan where it is published.
Schedule 8 Part 1 paragraph 4	*(4) Appropriate information on protective action to be taken by the general public in the event of a radiation emergency.*

Guidance Part 1 paragraph 4	791 This is the key part of the prior information which describes the action that people should take if a radiation emergency occurs and how each different protective action will work in terms of reducing radiation doses. It should cover such matters as: (a) sheltering and associated action; (b) distribution and taking of stable iodine tablets, where appropriate; (c) evacuation, how the advice is to be given, what action to take before leaving, what to do with pets and other animals, what to take, how to go, where to go; (d) arrangements for particular groups such as children at school, the sick and elderly; and (e) longer term advice on the consumption of contaminated food and drink.
Schedule 8 Part 1 paragraph 5	*(5) The authority or authorities responsible for implementing the protective action referred to in paragraphs 3 and 4 above.*
Guidance Part 1 paragraph 5	792 The information provided in response to paragraphs 3 and 4 should make clear which authorities are responsible for implementing the protective action described.
Schedule 8 Part 1 paragraph 6	*(6) The extent of the detailed emergency planning zone.*
Guidance Part 1 paragraph 6	793 The information provided should describe the size and shape of the detailed emergency planning zone. This should take the form of a map showing the detailed emergency planning zone and may be accompanied by a general description of the area to aid understanding.
Schedule 8 Part 2 paragraph 7	*PART 2* *Information in relation to outline planning zones* *(7) Where the information set out at paragraphs 1 to 5 can be obtained.*
Guidance Part 2 paragraph 7	794 There is little difference in the types of information that the public should have access to in the detailed emergency planning zone and the outline planning zone. However, the information required by Part 1, paragraphs (2), (3), (4) and (5) should reflect the arrangements in the outline planning zone and the level of detail should be proportionate to the level of planning. For example it may be appropriate to provide a short summary of the emergency arrangements to make people living further afield aware of such arrangements. This does not necessarily need to specify any specific action. However, it should detail further sources of information and indicate that in the extremely unlikely event of a radiation emergency that triggers a response in the outline planning zone, members of the public in the area may be asked to take action but that more information will be provided at the time. 795 The manner in which members of the public are provided with access to prior information will differ in the outline planning zone compared with the detailed emergency planning zone. See regulation 21(1) ACOP paragraphs 546-547 for further guidance.
Schedule 8 Part 2 paragraph 8	*(8) The extent of the outline planning zone.*

Guidance Part 2 paragraph 8	796 The information provided should include a description of the size and shape of the outline planning zone. This should take the form of a map showing the outline planning zone and may be accompanied by a general description of the area to aid understanding.
Schedule 8 Part 2 paragraph 9	*(9) The factors which would cause the plan in respect of the outline planning zone to be triggered, and whether there are any areas of detailed planning within the outline planning zone as defined at paragraph 4 of Part 2 of Schedule 6.*
Guidance Part 2 paragraph 9	797 This information must state at what stage and how the response to an emergency would trigger a response in the outline planning zone (see paragraphs 759-761 for further guidance). This should describe in terms comprehensible to the reader the work activity and event(s) which may give rise to a radiation emergency that triggers a response in the outline planning zone, and the likelihood of such an emergency occurring. 798 Where there are pockets of detailed planning within the outline planning zone (see paragraph 762-764 for further guidance) prior information should be distributed to such groups in the same manner as that received by members of the public in the detailed emergency planning zone.

Schedule 9 Information to be supplied in the event of a radiation emergency

Regulation 22(4)

Guidance Schedule 9	799 This Schedule lists information to be provided in the event of an actual emergency through the arrangements established by local authorities under regulation 22. Regulation 22(4) makes clear that only information relevant to a particular type of emergency needs to be supplied. Inclusion of information that is not relevant to the particular circumstances of the emergency is likely to cause confusion and be counterproductive. 800 The information will be similar in scope to that required for prior information (see regulation 21 or the information made available for transport emergencies by Great Britain's Transport Competent Authority (Office for Nuclear Regulation)) but only in respect of the specific emergency that has arisen. Where protective action is referred to, regulation 22(4) requires the information to identify the authority or authorities responsible for implementing that protective action. 801 Local authorities should develop pre-prepared information where possible and could use existing materials where appropriate. For example plain language information on radioactivity and its effects. In the event of an emergency, the local authority should then select the relevant pre-prepared information to provide to the public, amending it as appropriate to reflect the actual situation which occurs. Local authorities with off-site emergency plans under these Regulations should base this information on the protective action in the plan.
Schedule 9 paragraph 1	*1. Information on the type of emergency which has occurred, and, where possible, its characteristics, for example, its origin, extent and probable development.*
Guidance Schedule 9 paragraph 1	802 This would be much as provided under paragraph 2 of Schedule 8, but related to the specific emergency that has occurred, the conditions that actually exist and the likely course of development.

Schedule 9 paragraph 2	*2. Advice on protective action which may include, depending on the type of emergency—* *(a) any restrictions on the consumption of certain foodstuffs and water supply likely to be contaminated;* *(b) any basic rules on hygiene and decontamination;* *(c) any recommendation to stay indoors;* *(d) the distribution and use of protective substances;* *(e) any evacuation arrangements;* *(f) special warnings for certain population groups.*
Guidance Schedule 9 paragraph 2	803 This should be much as provided under paragraph 4 of Schedule 8, but related to the specific protective action relevant to the circumstances. Details concerning evacuation arrangements are especially important. The target audience of information in respect of sub-paragraph (a) could include providers of food that could be exposed to contamination and water. For example farmers and water suppliers, as well as consumers. (See paragraph 598 on regulation 22(3) regarding informing the public about restrictions on consumption of water.)
Schedule 9 paragraph 3	*3. Details concerning any announcements recommending cooperation with instructions or requests by the regulator.*
Guidance Schedule 9 paragraph 3	804 Individuals cannot be compelled to co-operate with any protective action decided on (such as evacuation), but any announcements should make clear that this is authoritative advice which it is in their interests to follow.
Schedule 9 paragraph 4	*4. Where an incident which is likely to give rise to a release of radioactivity or ionising radiation has taken place but no release has yet occurred, the information and advice should include the following—* *(a) details of the relevant communications channels on which information about the incident will be available;* *(b) preparatory advice to establishments with particular collective responsibilities; and* *(c) recommendations to occupational groups particularly affected.*
Guidance Schedule 9 paragraph 4	805 Where an emergency does not lead immediately to a release of radioactivity, advantage should be taken of this pre-release period so far as is reasonably practicable (whilst considering the effects of the pre-release information, see paragraph 588 for further guidance) to: (a) prepare people by advising them how to access the relevant communication channels to receive information, for example by getting them to tune in to local radio and television stations; (b) alert and provide preparatory advice to establishments in the potentially affected area, such as schools, factories, commercial buildings, hospitals, general practices and nursing homes; and (c) provide advice to providers of food that may potentially be exposed to contamination (e.g. farmers) on actions they can take to prevent or minimise the contamination of food. 806 The local authority should also consider particular establishments as priority places for the receipt of information about an emergency, including its magnitude, likely impact and guidance on the steps to be taken.

Schedule 9 paragraph 5	*5. If time permits, information setting out the basic facts about radioactivity and its effects on persons and on the environment.*
Guidance Schedule 9 paragraph 5	807 Under emergency circumstances, distribution of this background information cannot be a priority, but as time passes and if the pressure eases, this should be given attention. This information is the same as required by paragraph 1 of Schedule 8, and where a standard leaflet or booklet has been used for this purpose, this could be distributed to those affected. In the case of transport emergencies the prior information provided by the Office for Nuclear Regulation on its website could be used [to be published].
Schedule 9 paragraph 6	*6. In paragraph 4(b), "establishments with particular collective responsibilities" means hospitals, care homes, schools or similar establishments.*

Schedule 10 Consequential amendments

Regulation 29

Schedule 10

Road Vehicles (Construction and Use) Regulations 1986

1. *Regulation 37 of the Road Vehicles (Construction and Use) Regulations 1986([22]) is amended as follows—*

(a) in paragraph (5)(k) omit "radiation accident or" in both place it occurs; and

(b) in paragraph (9A) for the definition of "radiation accident" and "radiation emergency" substitute—

""radiation emergency" has the same meaning as in the Radiation (Emergency Preparedness and Public Information) Regulations 2019.".

Road Vehicles Lighting Regulations 1989

2. Regulation 3 of the Road Vehicles Lighting Regulations 1989([23]) is amended as follows—

(f) in the definition of "emergency vehicle" omit "radiation accident or" in both places it occurs; and

(g) in the definition of "radiation accident" and "radiation emergency"—

(i) omit "radiation accident and"; and

(ii) for "2001" substitute "2019".

Health and Safety (Enforcing Authority) Regulations 1998

3. In regulation 4A(2)(aa) of the Health and Safety (Enforcing Authority) Regulations 1998([24]) for "Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "Radiation (Emergency Preparedness and Public Information) Regulations 2019".

Civil Contingencies Act 2004 (Contingency Planning) (Scotland) Regulations 2005

4. In regulation 9(c) of the Civil Contingencies Act 2004 (Contingency Planning) (Scotland) Regulations 2005([25]) for "Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "Radiation (Emergency Preparedness and Public Information) Regulations 2019".

([22]) S.I. 1986/1078. Paragraph (5)(k) and (9A) were substituted by S.I. 2011/935. There are other amendments, but none are relevant to this instrument.

([23]) S.I. 1989/1796. Regulation 3 was amended by S.I. 2005/2559. There are other amendments, but none are relevant to this instrument.

([24]) S.I. 1998/494. Regulation 4A was inserted by S.I. 2014/469 and amended by S.I. 2017/1075.

([25]) S.S.I. 2005/494. Regulation 9 has been amended, but that amendment is not relevant to this instrument.

	Civil Contingencies Act 2004 (Contingency Planning) Regulations 2005 *5. In regulation 12(e) of the Civil Contingencies Act 2004 (Contingency Planning) Regulations 2005([26]) for "Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "Radiation (Emergency Preparedness and Public Information) Regulations 2019".* ***Radioactive Contaminated Land (Modification of Enactments) (England) Regulations 2006*** *6. In regulation 17(3) of the Radioactive Contaminated Land (Modification of Enactments) (England) Regulations 2006([27]) in the inserted paragraph (4C) for "paragraph (2) of regulation 13 (implementation of emergency plans) of the Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "paragraph (3) of regulation 17 (implementation of emergency plans) of the Radiation (Emergency Preparedness and Public Information) Regulations 2019".* ***Radioactive Contaminated Land (Modification of Enactments) (Wales) Regulations 2006*** *7. In regulation 17(3) of the Radioactive Contaminated Land (Modification of Enactments) (Wales) Regulations 2006([28]) in the inserted paragraph (4C) for "paragraph (2) of regulation 13 (implementation of emergency plans) of the Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "paragraph (3) of regulation 17 (implementation of emergency plans) of the Radiation (Emergency Preparedness and Public Information) Regulations 2019".* ***Radioactive Contaminated Land (Scotland) Regulations 2007*** *8. In regulation 15 of the Radioactive Contaminated Land (Scotland) Regulations 2007([29]) in the inserted subsection 7(a) for "regulation 12(2) of the Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "regulation 17(3) of the Radiation (Emergency Preparedness and Public Information) Regulations 2019".* ***Local Government (Structural Changes) (Transitional Arrangements) (No. 2) Regulations 2008*** *9. (1) Regulation 11 of the Local Government (Structural Changes) (Transitional Arrangements) (No. 2) Regulations 2008([30]) is amended as follows.* *(2) In paragraph (2)(c) for "regulation 9 of the Radiation (Emergency Preparedness and Public Information) Regulations ("the 2001 Regulations") substitute "regulation 11 of the Radiation (Emergency Preparedness and Public Information) Regulations 2019 ("the 2019 Regulations")".* *(3) In paragraph 4—* *(a) in sub-paragraph (a) for "2001" substitute "2019";* *(b) in sub-paragraph (b) from "an assessment" to the end, substitute "an evaluation or an assessment made by the operator under regulation 4 or 6 of the 2019 Regulations which does not reveal the potential for the occurrence of a radiation emergency".* *(4) In paragraph 5 for "2001" substitute "2019".* ***Human Medicines Regulations 2012*** *10. (1) The Human Medicines Regulations 2012([31]) are amended as follows.* *(2) In regulation 8(1) in the definition of radiation emergency for "Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute*

([26]) S.I. 2005/2042. Regulation 12 has been amended, but that amendment is not relevant to this instrument.

([27]) S.I. 2006/1379. Regulation 17 was substituted by S.I. 2008/520. Other amendments have been made but none are relevant to this instrument.

([28]) S.I. 2006/2988 (W. 277). Regulation 17 was substituted by S.I. 2008/521. Other amendments have been made but none are relevant to this instrument.

([29]) S.S.I. 2007/179. Regulation 15 was substituted by S.I. 2007/3240. Other amendments have been made but none are relevant to this instrument.

([30]) S.I. 2008/2867. Amendments have been made but none are relevant to this instrument.

([31]) S.I. 2012/1916, which was amended by S.I. 2018/64 and S.I. 2018/199.

	"Radiation (Emergency Preparedness and Public Information) Regulations 2019". *(3) In the entry numbered 19 in the first column of the table in Part 5 of Schedule 17 for "Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "Radiation (Emergency Preparedness and Public Information) Regulations 2019".* ***Infrastructure Planning (Interested Parties and Miscellaneous Prescribed Provisions) Regulations 2015*** *11. The table in Part 2 of Schedule 2 to the Infrastructure Planning (Interested Parties and Miscellaneous Prescribed Provisions) Regulations 2015([32]) is amended as follows—* *(a) in column 1 for "Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "Radiation (Emergency Preparedness and Public Information) Regulations 2019"; and* *(b) for column 2 of the entry for "Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute—* *"Any evaluation required under regulation 4 (hazard evaluation)* *Any assessment required under regulation 5 (consequence assessment)* *Any assessment required under regulation 6 (review of hazard evaluation and consequence assessment)".* ***Health and Safety and Nuclear (Fees) Regulations 2016*** *12. (1)The Health and Safety and Nuclear (Fees) Regulations 2016([33]) are amended as follows.* *(2) In regulation 8—* *(a) in the heading for "Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "Radiation (Emergency Preparedness and Public Information) Regulations 2019";* *(b) in paragraph 4 for "2001" in each place it occurs substitute "2019";* *(c) in paragraph 11 for the definition of "the 2001 Regulations" substitute—* *""the 2019 Regulations" means the Radiation (Emergency Preparedness and Public Information) Regulations 2019".* *(3) In Schedule 6—* *(a) in the heading for "Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "Radiation (Emergency Preparedness and Public Information) Regulations 2019";* *(b) in the first column of table 2 for "regulation 14 of the 2001 Regulations" in both places it occurs substitute "regulation 18 of the 2019 Regulations".* ***Ionising Radiations Regulations 2017*** *13. In regulation 36(1) of the Ionising Radiations Regulations 2017([34]) for "Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "Radiation (Emergency Preparedness and Public Information) Regulations 2019".* ***Ionising Radiation (Basic Safety Standards) (Miscellaneous Provisions) Regulations 2018*** 14. *In regulation 4(2)(a) of the Ionising Radiation (Basic Safety Standards) (Miscellaneous Provisions) Regulations 2018([35]) for "paragraph (2) of regulation 13 (implementation of emergency plans) of the Radiation (Emergency Preparedness and Public Information) Regulations 2001" substitute "paragraph (3) of regulation 17 of the Radiation (Emergency Preparedness and Public Information) Regulations 2019".*

([32]) S.I. 2015/462. Amendments have been made but none are relevant to this instrument.

([33]) S.I. 2016/253. Regulation 8 was amended by S.I. 2017/1075. Other amendments have been made but none are relevant to this instrument.

([34]) S.I. 2017/1075. Amendments have been made but none are relevant to this instrument.

([35]) S.I. 2018/482. Amendments have been made but none are relevant to this instrument.

Guidance Schedule 10	**EXPLANATORY NOTE** *(This note is not part of the Regulations)* *These Regulations revoke and supersede the Radiation (Emergency Preparedness and Public Information) Regulations 2001.* *The Regulations impose duties on operators of premises in which work with ionising radiation takes place to identify the hazards arising from the work with such radiation which have the potential to cause a radiation emergency. Where such hazards exist, the operator is under a duty to assess the consequences of the radiation emergency, and liaise with the local authority. Both the local authority and the operator must engage in planning against the radiation emergency occurring, test such plans at regular intervals and provide information to the public.* *The Regulations implement in part as respects Great Britain provisions of Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom (OJ No L13, 17.1.2014, p 1).* *Regulation 3 makes provision for the application of the Regulations. The Regulations apply to work with ionising radiation on premises on which there is a radioactive substance containing more than the quantity of any radionuclide set out in Schedule 1, or, in the case of fissile material, more than the mass of the fissile material, as set out in Schedule 2. Where a radionuclide is not specified in Schedule 1, the operator must assess whether the quantity present on the premises would allow an annual dose of greater than 1 mSv, and, if so, these Regulations also apply.* *Regulation 4 provides that the operator must, before work is carried out for the first time at the premises, carry out an evaluation of the hazards arising from the work undertaken on the premises to determine whether they have the potential to cause a radiation emergency. Where they have that potential, regulation 4 require operators to undertake protective actions.* *Regulation 5 provides that, where an operator has identified the potential for a radiation emergency pursuant to its evaluation, the operator must make a further assessment in accordance with Schedule 3 to evaluate a full range of consequences of such a radiation emergency.* *Regulation 6 provides that, where the operator proposes a change in its work with ionising radiation, or where a change occurs, the operator must undertake review of its evaluation in accordance with regulation 4 and either make a further assessment in accordance with regulation 5 or make a declaration that the change of circumstances which triggered the review would not affect the last evaluation.* *Regulation 7 requires the operator to send a consequences report to the local authority, which includes a proposed detailed emergency planning zone, and must discuss those consequences with the local authority.* *Regulation 8 provides that it is the responsibility of the local authority to determine the detailed emergency planning zone, either on the basis of the operator's proposal or, on the basis that the local authority's off-site emergency plan requires it, to extend the detailed emergency planning zone.* *Regulation 9 provides for who will determine an outline planning zone in relation to certain sites.* *Regulation 10 provides that the operator is responsible for preparing an emergency plan*

	where the evaluation under regulation 4 shows that a radiation emergency may arise. *Regulation 11 provides that, where there is a detailed emergency planning zone, an outline planning zone, or both, the local authority must prepare an off-site emergency plan to mitigate the consequences of a radiation emergency outside the operator's premises.* *Regulation 12 makes provision for the reviewing and testing of both the operator's on-site emergency plan and the local authority's off-site emergency plan.* *Regulation 13 provides for cooperation between the operator and the local authority in fulfilling their duties to prepare emergency plans, and regulation 14 provides for cooperation between local authorities in the making and testing of off-site emergency plans. Regulation 15 provides for cooperation between operators and other employers on the same premises.* *Regulation 16 provides that a local authority may charge the operator for performing its functions in relation to the preparation and testing of an off-site emergency plan.* *Regulation 17 sets out when operators and local authorities should implement their emergency plans and who should be informed about that implementation. Regulation 17 also provides for a full assessment of the consequences of any radiation emergency which occurs and the effectiveness of the emergency plans after any implementation.* *Regulation 18 provides that training and equipment should be provided to employees by their employer where there is the possibility of that employee receiving an emergency exposure of ionising radiation and makes further provision for employees where an emergency plan is put into place.* *Regulation 19 disapplies regulation 12 of the Ionising Radiations Regulations 2017 to an emergency worker who is engaged in preventing or mitigating the consequences of a radiation emergency.* *Regulation 20 provides that the operator's emergency plans and the local authority's off-site emergency plans must prioritise reducing doses below 100 mSv. When the response to a radiation emergency is underway, specific reference levels for the public may be determined by the local authority, who may seek advice from the person coordinating the off-site response to that emergency. In exceptional circumstances, the reference level for emergency workers may be set in excess of 100 mSv, but not exceeding 500 mSv.* *Regulations 21 and 22 provide for information to be provided to the public in an area covered by a detailed emergency planning zone and in the event of an emergency respectively.* *Regulation 23 provides for the retention of information by the operator and the local authority.* *Regulation 24 contains provisions requiring employers to consult radiation protection advisors where the employer is engaged in work with ionising radiation for the purposes of the radiation protection advisor to advice on compliance with these Regulations.* *Regulation 25 provides for specific modifications of the Regulations for the purposes of the Ministry of Defence, relating to national security.* *Regulation 26 provides that, where a person is entitled to seek information under the Regulations, the Secretary of State may certify that the provision of that information would be contrary to the interests of national security.* *Regulation 27 provides for the revocation of the Radiation (Emergency Preparedness and Public Information) Regulations 2001, subject to the transitional and savings provisions set out in regulation 28.*

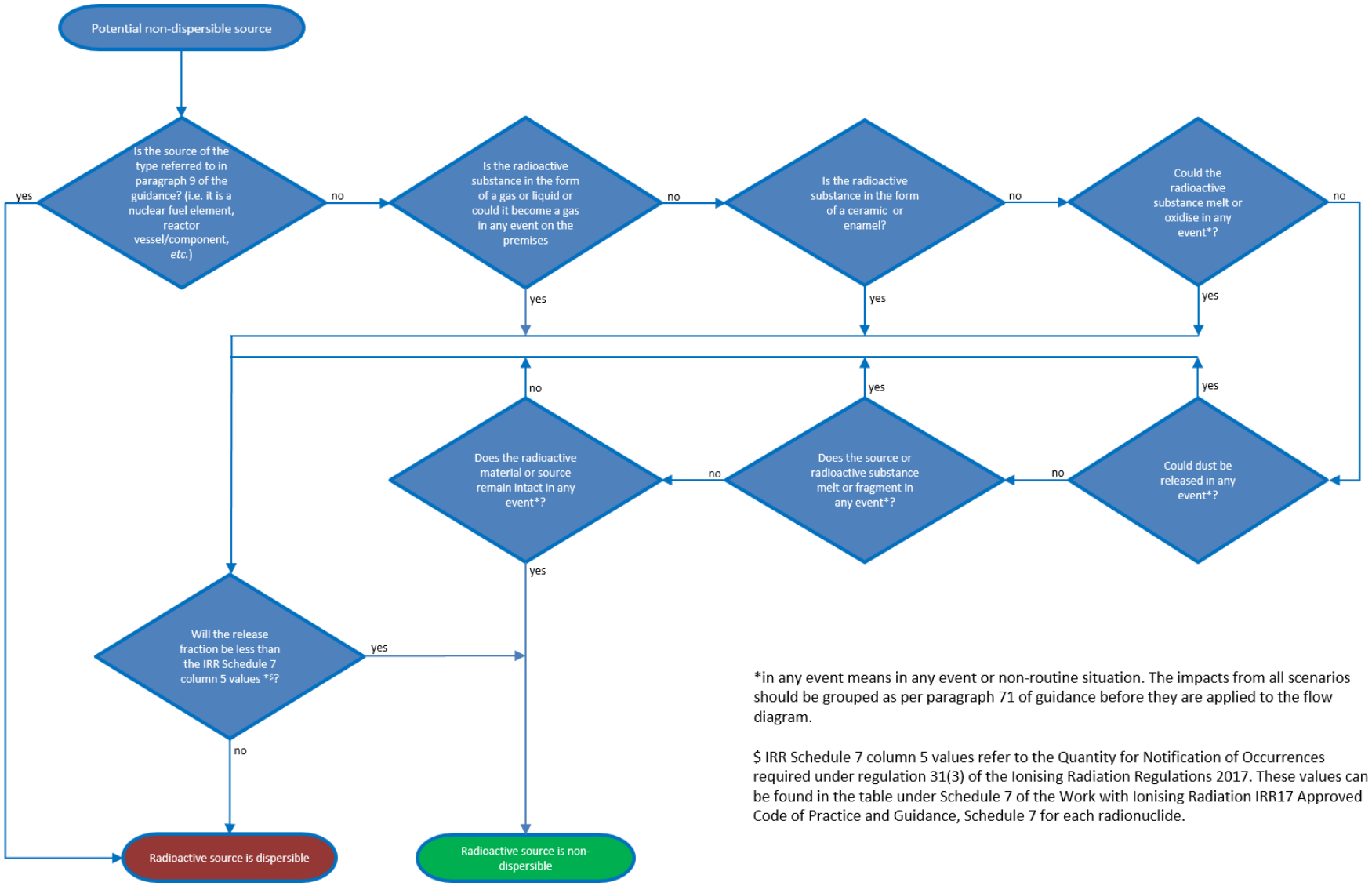
	Regulation 29 and Schedule 10 provide for consequential amendments. *Regulation 30 provides that the Secretary of State must review the Regulations on a regular basis.* *A full impact assessment of the effect that this instrument will have on the costs of business, the voluntary sector and the public sector is available from the Department for Business, Energy and Industrial Strategy, 1 Victoria Street, London.*

Appendix 1 Assessing the dispersibility of radioactive sources and substances

Guidance Appendix 1	1. Operators should use the information in this appendix to help them complete the assessments of the dispersal risks associated with the radioactive source(s) or substance(s) they use or keep at their premises. 2. Figure 1 sets out the important questions to which operators should have satisfactory answers to be able to conclude that the radioactive source or substance being assessed is non-dispersible for the purpose of REPPIR (see definition of sealed source and non-dispersible source in regulation 2(1) and paragraphs 11-13 and 66). 3. The figures should be used as a guide on what an assessment should contain. The Health and Safety Laboratory Research Report FS/99/19 Release fractions for radioactive sources in fires [46] gives further information about radioactive substance dispersibility assessment. *4.* It is the operator's responsibility to consider all emergency scenarios that might affect their premises and the possible effect these events might have on the chemical and physical stability of the radioactive substances they use or keep at their premises. In the case of sealed sources, it is particularly important that operators are confident about the way in which any encapsulation will behave in an emergency situation.

Guidance Appendix 1 Figure 1

Figure 1: Dispersibility assessment flow chart.



*in any event means in any event or non-routine situation. The impacts from all scenarios should be grouped as per paragraph 71 of guidance before they are applied to the flow diagram.

$ IRR Schedule 7 column 5 values refer to the Quantity for Notification of Occurrences required under regulation 31(3) of the Ionising Radiation Regulations 2017. These values can be found in the table under Schedule 7 of the Work with Ionising Radiation IRR17 Approved Code of Practice and Guidance, Schedule 7 for each radionuclide.

Appendix 2 Risk Framework

Regulations 4 & 5

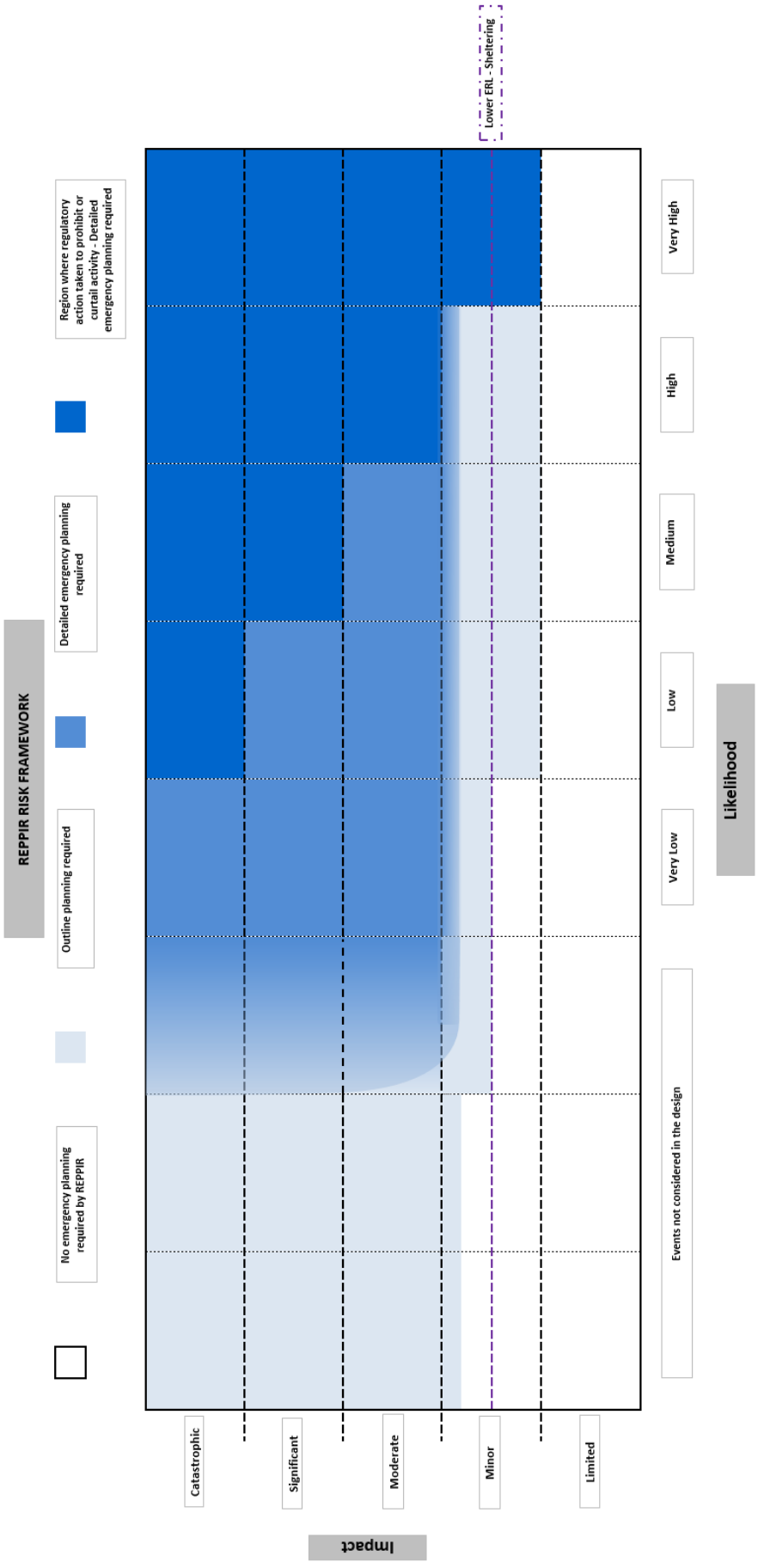
Appendix 2 ACOP Figure 1: Impact Table

		Descriptors				
		1	2	3	4	5
	Impact descriptor and effective dose	Human life (Acute exposure/ Determinstic Effects)	Health & Safety (Cancer induction)	Quality of life	Property	Environment
Impact A	Catastrophic (> 1 Sv)	Death and life changing consequences severe determinstic effects possible.	Possibility of life changing consequences because of significant (> 5%) increased risk of cancer induction.	Complete reconstruction of life activities.	Asset value completely lost.	Exclusion zones increase and heavy restrictions extended to further distance.
B	Significant (100-1000 mSv)	possiblity of moderate deterministic effects.	Possibility of life changing consequences increases because of small (0.5-5 %) increased risk of cancer induction.	Initial reconstruction and continued interruption of normal life activities.	Major asset value depreciation.	Exclusion zones of environmental areas and heavy restrictions.
C	Moderate (10-100 mSv)	No potential for deterministic effects, below threshold dose.	Possibility of life changing consequences increases because of very small (0.5 %) increased risk of cancer induction.	Enforced prevention or interruption of normal life activities.	Potential or real asset value depreciation.	Restricted or temporary loss of environmental growth or produce.
D	Minor (1-10 mSv)	No potential for deterministic effects, below threshold dose.	Minimal impacts and unlikely to have life changing consequences.	Potential self-imposed restrictive changes in normal life activities.	Assumed asset value depreciation.	Reluctance to use environmental areas and produce.
E	Limited (less than 1 mSv)	No potential for deterministic effects, below threshold dose.	Normal background.	Sustained normal life activities.	Asset value sustainable or dominated by market forces.	Sustainaned environmental conditions.

Appendix 2 ACOP Figure 2: Likelihood Table

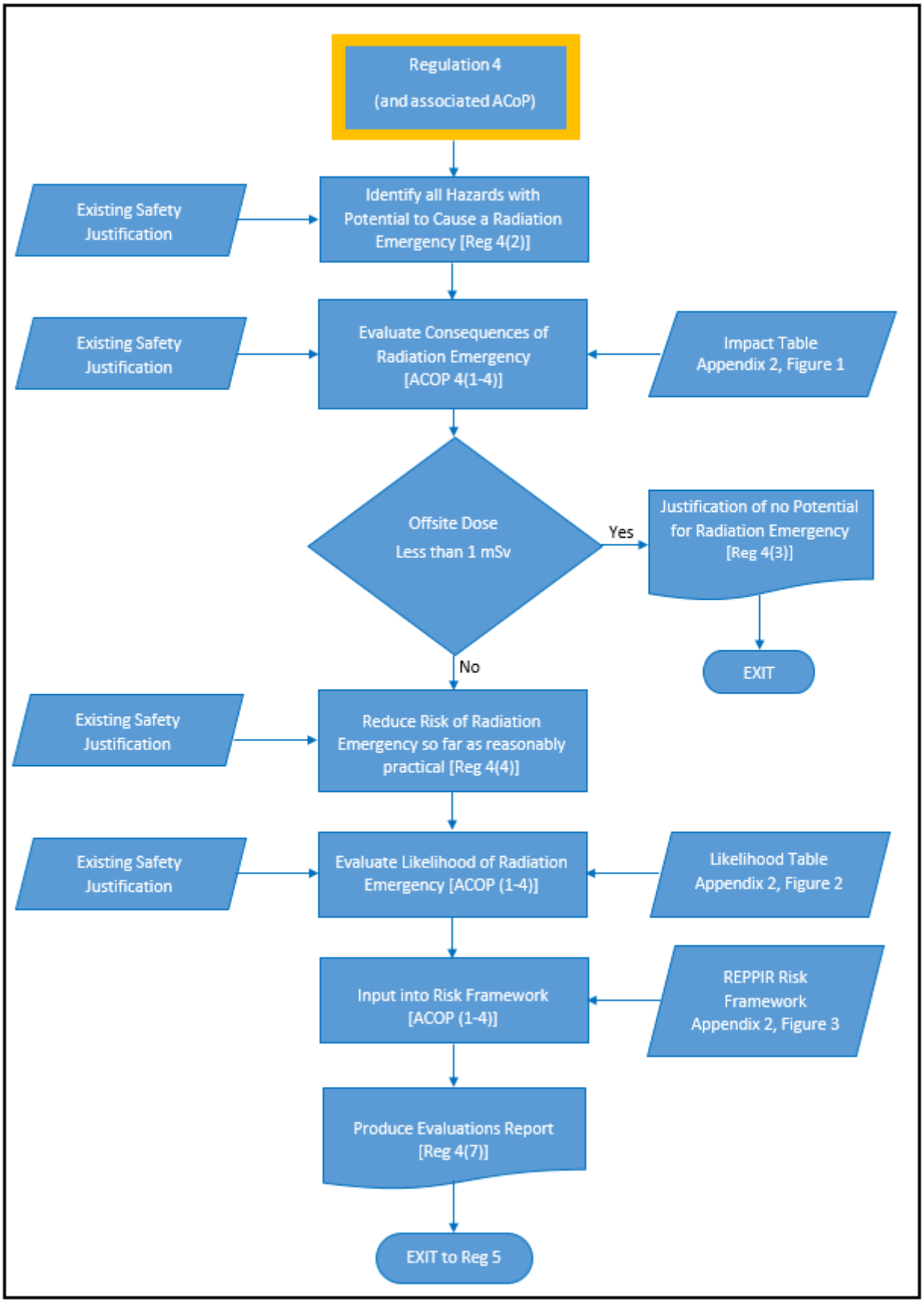
Likelihood descriptor	Relative likelihood of occurring in the next 5 years
Events not considered in the design	Less than 1 in 20,000
Very low	1 in 20,000 - 1 in 2,000
Low	1 in 2,000 - 1 in 200
Medium	1 in 200 - 1 in 20
High	1 in 20 - 1 in 2
Very High	Greater than 1 in 2

Appendix 2 ACOP Figure 3: Risk Framework

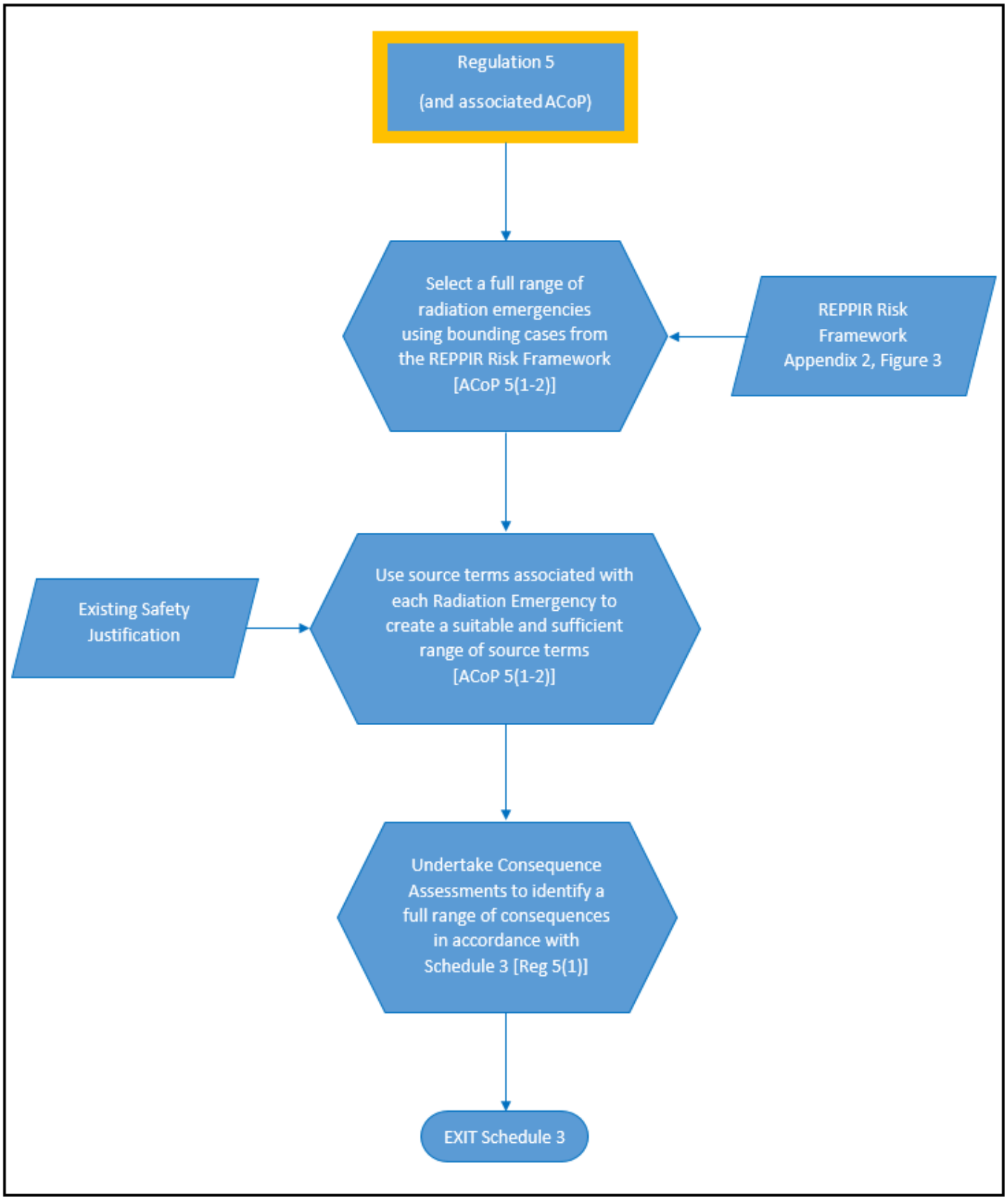


APPENDIX 2 – FIGURE 4A

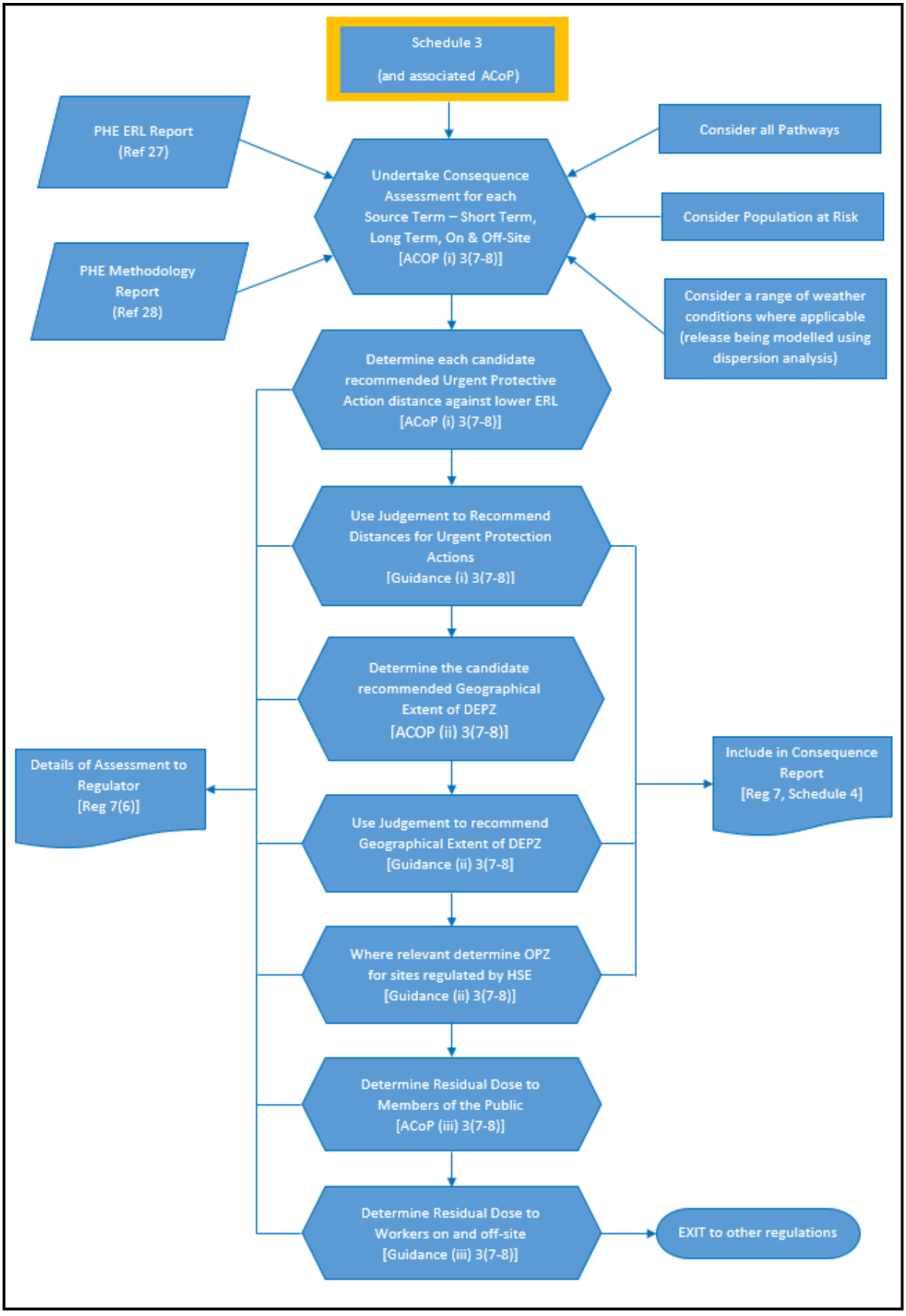
HAZARD EVALUATION AND CONSEQUENCE ASSESSMENT (HECA) FLOW DIAGRAM



APPENDIX 2 – FIGURE 4B



APPENDIX 2 – FIGURE 4C



Appendix 3 Abbreviations

Guidance Appendix 3 Abbreviations

ACOP	Approved Code of Practice
ADR	European Agreement concerning the International Carriage of Dangerous Goods by Road
Bq / GBq	Becquerel / Giga-Becquerel
BSSD	The Basic Safety Standards Directive 2013 (EURATOM)
CAA	Civil Aviation Authority
CAP 168	Civil Aviation Publication 168 *Licensing of aerodromes*
CCA	Civil Contingencies Act
CDG	The Carriage of Dangerous Goods and Use of Transportable Pressure Equipment Regulations 2009 (as amended 2019)
COMAH	Control of Major Accident Hazards Regulations 2015
DGHAR	Dangerous Goods in Harbour Areas Regulations 2016
DRF	Dose Reduction Factor
EASR	Environmental Authorisations (Scotland) Regulations 2018
ERL	Emergency Reference Level
EURATOM	European Atomic Energy Community
FMEA	Failure Mode and Effects Analysis
HAZAM	Hazard Assessment Methodology
HAZOP	Hazard Operability Analysis
HM	Her Majesty's
HSE	Health and Safety Executive
HSWA	Health and Safety at Work Act 1974
IAEA	International Atomic Energy Authority
ICRP	International Commission on Radiological Protection
INES	International Nuclear Event Scale
ISO	International Organisation for Standardisation

	JESIP	Joint Emergency Services Interoperability Principles
	MCA	Maritime and Coastguard Agency
	METHANE	Major Incident Declared, Exact location, Type of incident, Hazards Access, Number and type of casualties and Emergency services present and required
	MHSWR	Managing Health and Safety at Work Regulations 1999
	MOD	Ministry of Defence
	MOU	Memorandum of Understanding
	NIA	Nuclear Installations Act 1965
	NNEPRG	National Nuclear Emergency Planning and Response Guidance
	ONR	Office for Nuclear Regulation
	OPZ	Outline Emergency Planning Zone
	PHE CRCE	Public Health England Centre for Radiation, Chemicals and Environmental Hazards
	PSA	Probability Safety Assessment
	QRA	Quantitative Risk Assessment
	REPPIR	Radiation (Emergency Preparedness and Public Information) Regulations 2019
	RMU	Radiation Monitoring Unit
	RPA	Radiation Protection Adviser

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