



HM Government



The Scottish
Government
Riaghaltas na h-Alba

Nuclear Emergency Planning and Response Guidance

ANNEXES

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Contents

Annex A: REPPiR Off-Site Emergency Planning Process.....	5
Annex B: Legislation.....	10
Annex C: Risk assessment.....	16
Annex D: Approach for carrying out an extendibility assessment.....	20
Preparing for an extendibility assessment:.....	20
Carrying out an extendibility assessment:.....	20
Annex E: Exercise Matrix.....	22
Annex F: Exercise Planning Process.....	26
Annex G: Standard Agenda Template (for first Planning Meeting).....	27
Annex H: Exercise Order template.....	28
Annex I: Exercise Assessment.....	30
Annex J: Assessment Form.....	31
Annex K: International Nuclear and Radiological Event Scale.....	33
Annex L: Welsh Government Arrangements.....	34
Annex M: Scottish Government Arrangements.....	36
Annex N: Overseas Arrangements.....	38
Annex O: Countermeasure Advice Template.....	44
Annex P: Radiation Monitoring.....	46
Annex Q: Radiation Protection.....	47
Annex R: REPPiR Public Information Requirements.....	50
Annex S: Supporting recovery guidance.....	51
Annex T: Factors informing the decision to hand over co-ordination of the response ..	53
Annex U: Long term consequences of a nuclear emergency.....	56
Annex V: The importance of radiological monitoring in defining the situation.....	61
Annex W: Radiological protection principles following a nuclear emergency.....	64
Annex X: Waste management following a nuclear emergency.....	65
Annex Y: Environment Agency Regulatory position statement (765_13) The management of radioactive wastes following a major incident.....	74
Annex Z: Practical guidelines for managing wastes contaminated with radioactivity....	76

Annex A1: Guidance from the Food Standards Agency on the current position on the disposal of food contaminated with radioactivity	78
Annex B2: Typical timeline for the development and delivery of a nuclear recovery exercise	80
Annex C3: Guidance to support the testing of emergency plans	81
Annex D4: Nuclear recovery exercise objectives and suggested formats	82
Annex E5: Template for developing the sequence of events leading up to the start of a nuclear recovery exercise.....	88
Annex F6: Glossary, Abbreviations and Acronyms:.....	90

Annex A: REPIR Off-Site Emergency Planning Process

1. The following table provides a summary of the regulations under REPIR and what is required by both the operator and relevant local authority.

Planning Steps	What it Involves	REPIR
Risk Assessment	Operator produces and reviews a Hazard Identification and Risk Evaluation (HIRE) to identify hazards and risks associated with operations involving ionising radiation.	Regulation 4 and 5
	Operator sends Report of Assessment (RoA) conducted under Regulation 4 or 5 to ONR . The ONR will consider whether the reports have identified reasonably foreseeable radiation emergencies.	Regulation 6 Schedule 5
	Operator shares RoA with Local Authority (LA) to provide hazard and risk information.	Regulation 9(4)
Where RoA shows that it is reasonably foreseeable that a radiation emergency can occur, emergency plans and public information are required.		
Emergency Planning	Operator produces an ‘operator emergency plan’ detailing the roles that those who work on the premises will have to play in the event of a radiation emergency.	Regulation 7 Part 1 of Schedule 7
	LA produces an ‘off site emergency plan’ to restrict, as far as is reasonably practicable, the exposure to ionising radiation of persons who may be affected. The ‘off site emergency plan’ will cover an area (Detailed Emergency Planning Zone (DEPZ)) determined by the ONR .	Regulation 9 Regulation 14 Regulation 17 Part 3 of Schedule 7
	Operator and LA are required to ‘dovetail’ emergency plans to ensure that:	Regulation 7(2)

	<ul style="list-style-type: none"> Measures taken by the operator to prevent radiation emergencies or limit their consequences are taken into account in off site emergency arrangements. Emergency services support to on site response action can be effectively provided. 	Regulation 9(12)
	The 'off site emergency plan' must contain information specified in REPPIR.	Part 3 of Schedule 7
	The plan should cover arrangements for the provision of response capabilities cover in Part 2	
Consultation	<p>When producing or reviewing the 'operator's emergency plan', the operator must consult:</p> <ul style="list-style-type: none"> Employees. Contractors ONR Environment Agencies LA Local Police, Fire, and Ambulance NHS Public Health England 	Regulation 7(6)
	<p>When reviewing the 'off site emergency plan', the LA must consult:</p> <ul style="list-style-type: none"> Operator ONR Environment Agencies Local Police, Fire, and Ambulance National Health Service Public Health England Local Councillors Members of the Public (e.g. through Site Stakeholder Group) 	Regulation 9(12)

	<p>When producing prior information, the operator must consult the LA. The operator will normally also consult:</p> <ul style="list-style-type: none"> • Environment Agencies • Local Police, Fire, and Ambulance. • National Health Service • Public Health England • Food Standards Agency / Food Standards Scotland • Water Companies 	Regulation 16(2)
	<p>Consultation between agencies with responsibilities under REPIR or roles within emergency response plans should take place at a dedicated meeting to allow:</p> <ul style="list-style-type: none"> • Sharing hazard and risk information. • Sharing emergency planning information. • Development of training and exercise events. • Sharing of learning from incidents or exercises. 	Regulation 11(3)
	<p>The Operator and LA should agree local solutions for meetings to provide a meeting framework for cooperation over emergency plans for reasonably foreseeable radiation emergencies and to support 'extendibility' using wider civil emergency arrangements.</p>	CCA Emergency Preparedness – Chapter 19
Plan Testing	<p>At least every 3 years, the operator must test the 'operator emergency plan' and the LA must test the 'off site emergency plan'. The test is aimed at demonstrating that response personnel following either 'operator' or 'off site' emergency plans can adequately deal with a range of reasonably foreseeable radiation emergencies.</p>	Regulation 10(1)(b)
	<p>The LA should agree with the operator and local Police, Fire and Ambulance how the 'off site emergency plan' is to be tested. The LA remains responsible for testing the plan if no agreement can be reached with operator and local emergency services.</p>	Regulation 10(2)

Plan Review	<p>At least every three years, the operator must review the ‘operator emergency plan’ and the LA must review the ‘off site emergency plan’. The review must take into account:</p> <ul style="list-style-type: none"> • All material changes to the hazard and risk assessments on which emergency plans are based. • Any changes in the emergency services relevant to the operation of emergency plans. • Advances in technical knowledge, e.g. changes to Emergency Reference Levels. • Changes in staffing resources, including contractors. • Knowledge gained as a result of radiation emergencies occurring either on-site or elsewhere, e.g. Weightman Report on Fukushima. • Lessons learned during the testing of emergency plans. 	Regulation 10(1)(a)
Charging for work	<p>The LA can charge the operator for:</p> <ul style="list-style-type: none"> • The LA costs in preparing, reviewing, and testing the ‘off site emergency plan’. • Police, Fire, and Ambulance costs in testing the ‘off site emergency plan’, including on site response activities. 	Regulation 12
	<p>The LA can charge for costs that have been reasonably occurred and should be based upon the full cost of people (i.e. the pay grade plus an average of the employment overhead costs)</p>	
	<p>The LA cannot charge for emergency services costs during a test of the off-site emergency plan where they are not directly related to the plan, e.g. if wider training benefits are realised.</p>	
Public Information	<p><u>Hazard & Risk Assessment</u>. The operator will make public the report of the Assessment. ONR will assist this process and the LA can offer to publish the information on local resilience websites.</p>	Regulation 16(6)

	<p><u>Plans</u>. There are no REPPIR requirements to publish ‘operator’ or ‘off site emergency plans’, however best practice under the Civil Contingencies Act (CCA) suggests that plans, or parts of plans, can be published where it is useful for the public to know, or to help community groups to identify possible activities they could undertake in support of the plan. Further, publishing emergency plans produced under REPPIR may reduce Freedom of Information (FOI) requests that often require the ‘public interest test’ to be applied.</p>	<p>Emergency Preparedness – Chapter 5</p>
	<p><u>Prior Public Information</u>. The operator will supply prior information to identifiable population groups within an area defined by ONR. The operator will seek to reach an agreement with the LA to disseminate the prior information. The operator remains responsible for disseminating information if no agreement can be reached with the LA.</p>	<p>Regulation 16 Schedule 9</p>
	<p><u>Public Information During a Radiation Emergency</u>. Any LA, not just those with licenced nuclear sites, is required to provide information and advice on the facts of the emergency, of the steps to be taken and, as appropriate, of health protection measures applicable.</p>	<p>Regulation 17 Schedule 10 (as relevant to incident)</p>

Annex B: Legislation

Summary

1. A wide range of domestic legislation is in place to ensure that nuclear installations meet high environmental and safety standards. Operators of nuclear plants must demonstrate to the independent Office for Nuclear Regulation (ONR), or where applicable to the Defence Nuclear Safety Regulator that the activities on their sites are safe and comply with the necessary legislation.
2. This document covers the key legislation that underpins both response and recovery planning in the UK. Emergency responders are also bound by other non-nuclear specific legislation that sets out their roles and responsibilities during an emergency. These are not included in this annex.
3. The annex does not attempt to describe the interrelationship between all relevant legislation.

UK legislation

Legislation	Web Link	Notes	Organisations Affected
Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR)	http://www.legislation.gov.uk/ukxi/2001/2975/contents/made	REPPIR establishes a framework of emergency preparedness measures to ensure that members of the public likely to be affected are properly protected by adequate emergency plans; that these plans are regularly reviewed and tested; and that where necessary the public is informed in advance about what to do in the unlikely event of a radiation emergency occurring, and is provided with information in the event that a radiation emergency actually occurs.	Local Authorities, Industry This requires operators, carriers and LA's to prepare an emergency plan for their nuclear site(s) and test them regularly.

Legislation	Web Link	Notes	Organisations Affected
The Ionising Radiations Regulations 1999 (IRR99)	http://www.legislation.gov.uk/ukxi/1999/3232/contents/made	<p>IRR99 applies to a large range of workplaces where radioactive substances and electrical equipment emitting ionising radiation are used and covers a much wider range than just emergency planning.</p> <p>In relation to emergencies, IRR99 requires employers to:</p> <ul style="list-style-type: none"> • keep exposure to ionising radiations as low as reasonably practicable and below specified dose limits (with some special requirements and provisions for exposure in emergencies). • prepare contingency plans for reasonably foreseeable radiation accidents. 	<p>Industry</p> <p>Nuclear operators must adhere to these regulations to protect their employees from ionising radiation within acceptable dose limits.</p>
Nuclear Installations Act 1965 (NIA65)	http://www.legislation.gov.uk/ukpga/1965/57	<p>Most of the fixed sites requiring REPPiR offsite plans will also be licensed under NIA65. For such nuclear licensed sites NIA65 is very important since it:</p> <ul style="list-style-type: none"> • establishes the system of licensing which makes the site subject to a special system of rigorous regulation overseen by ONR involving Licence Conditions, approvals and consents. • Requires that Licensees take the steps necessary to secure that no injury to people or property is caused by ionising radiation from 	<p>Industry</p> <p>Operators must satisfy a strict regulatory criteria in order to be granted a licence to operate.</p>

Legislation	Web Link	Notes	Organisations Affected
		<p>their facility and lays down that they must accept strict (no fault) liability for any harm caused</p> <ul style="list-style-type: none"> States that one of the Licence Conditions established under NIA65 will include provisions covering a Licensee's responsibility to prepare for and deal with the effects of any accident (and not just those that may be reasonably foreseeable) 	
Health & Safety at Work Act 1974 (HSWA)	http://www.legislation.gov.uk/ukpga/1974/37/contents	The HSWA places a duty on employers to ensure the health, safety and welfare at work of their employees.	Industry, Emergency Responders Employers must take appropriate measures to manage risks to their staffs health and safety. This includes controlling the use of dangerous substances used on site.
Civil Contingencies Act 2004 and its supporting Regulations (The CCA 2004) (Contingency Planning Regulations 2005) and (The CCA 2004 Contingency Planning Regulations (Scotland) 2005)	http://www.legislation.gov.uk/ukpga/2004/36/contents	The Civil Contingencies Act delivers a single framework for civil protection in the UK. The Act is separated into 2 substantive parts: local arrangements for civil protection (Part 1); and emergency powers (Part 2).	Local Authorities Places a duty on local emergency planners to ensure robust planning arrangements are in place for emergencies (for nuclear the Off-Site Plan).
Control of Major Accident Hazards Regulations 2015	http://www.legislation.gov.uk/uksi/2015/483/contents/made	The main aim of COMAH is to prevent and mitigate the effects of major accidents involving dangerous substances which can cause serious damage/harm to people and/or the environment.	Industry Places a duty on operators to take all measures necessary to prevent a major accident and mitigate the consequences (not applicable to MoD). Places a duty on Local Authorities to prepare off-site plans.

Legislation	Web Link	Notes	Organisations Affected
Energy Act 2013	http://www.legislation.gov.uk/ukpga/2013/32/contents/enacted	The Energy Act places the ONR as the statutory body responsible for regulating the safety and security of the civil nuclear industry. The Act sets out the ONR's purposes and functions as ONR have responsibility for nuclear safety, nuclear security, nuclear safeguards, transport of radioactive material and health and safety on nuclear sites.	ONR Places a duty on ONR to ensure they have defined regulatory functions for nuclear safety, security, safeguards, and transport.
Environmental Permitting Regulations (England and Wales) 2010	http://www.legislation.gov.uk/ukdsi/2010/9780111491423/contents	These regulations set out the environmental permitting regime for radioactive substances.	Industry Operators must satisfy a criteria (set by ONR) to obtain the appropriate permit for their sites
The Justification of Practices Involving Ionising Radiation Regulations 2004 (JOPIIR)	http://www.legislation.gov.uk/uksi/2004/1769/contents/made	These regulations forbid any new practice to be undertaken which would result in the exposure of workers or members of the public to ionising radiation unless the practice belongs to a class or type that has been determined to be justified.	Industry Operators must gain approval from HMG in advance of beginning any new type of operation which might result in exposure to radiation. These regulations are needed in order to comply with BSSD.
Food and Environment Protection Act 1985	http://www.legislation.gov.uk/ukpga/1985/48	The FEPA provides the power to implement emergency orders in circumstances which are likely to create a hazard to human health through consumption of food.	HMG/Devolved Administrations The government has the power to dictate how potentially contaminated foodstuffs is handled.
The Water Industry Act 1991 (not applicable in Scotland)	http://www.legislation.gov.uk/ukpga/1991/56/contents	This legislation enables the water quality regulations to be made and sets out the duties of water companies and local authorities in respect of drinking water supplies. The act includes requirements for a water supplier to	Utilities Places responsibilities on water companies to ensure that contaminated water is managed effectively and safely and that there is water available that is fit for human consumption.

Legislation	Web Link	Notes	Organisations Affected
		have an emergency plan under the Security and Emergency Measures Direction 2006 which is the water industry element of the Civil Contingencies Act 2004.	
Local Government Act 2000 (not applicable in Scotland)	http://www.legislation.gov.uk/ukpga/2000/22/contents	The LGA 2000 places a general duty of care on the Local Authority to provide for the wellbeing of their community.	Local Authority Sets out minimum requirements for local authorities to provide for their local communities.
NHS Act 2006	http://www.legislation.gov.uk/ukpga/2006/41/contents	The NHS Act sets out the role of the Director of Public Health in providing leadership and expertise.	Local Authorities/NHS

3. Scotland specific legislation

Radioactive Substances Act 1993 (RSA93)	http://www.legislation.gov.uk/ukpga/1993/12/contents	This is the legislation for permitting of activities involving the keeping, treatment and disposal of radioactive waste in Scotland and Northern Ireland	Industry This places responsibility on operators to ensure radioactive material in their tenure is stored and handled safely.
Public Bodies (Joint Working) (Scotland) Act 2014	http://www.legislation.gov.uk/asp/2014/9/contents/enacted	Requires the establishment of health and social care partnerships between local authorities and NHS	Local Authorities/NHS
Public Health (Scotland) Act 2008	http://www.legislation.gov.uk/asp/2008/5/contents	Updates the law on public health, enabling Scottish Ministers, health boards and local authorities to better protect public health in Scotland. It will also assist Scottish Ministers to meet their obligations under the International Health Regulations. It directly applies to radioactive substances under the definition of “contamination” in section 1(5).	Scottish Ministers, local authorities and health boards. To protect the people of Scotland from infectious diseases.

Water (Scotland) Act 1980	http://www.legislation.gov.uk/ukpga/1980/45	Sets out the general duties and powers of the statutory water undertaker in Scotland to supply water, maintain water quality, and conserve and protect water resources.	Scottish Ministers, local authorities and health boards. Places responsibilities on water companies to ensure that contaminated water is managed effectively and safely and that there is water available that is fit for human consumption.
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Annex C: Risk assessment

1. This section describes how risk is determined for UK nuclear sites and how this informs operator and off-site planning required under REPPiR.
2. There are many potential hazards within a nuclear facility. One of the main hazards comes from the potential for radioactive materials within the facility to be released into the environment where they could lead to people being exposed to radiation. A key objective is therefore to prevent the release of any significant quantity of radioactivity.
3. The designs of nuclear facilities operating in the UK incorporate the philosophy of **defence in depth**. “Defence in depth” is delivered by ensuring there is a series of safety barriers and systems each of which will prevent or significantly mitigate an accidental release of radioactive material. Each one of these barriers or systems should be designed to protect the public from the hazard potential within the nuclear facility.
4. **Engineered safety barriers** include, for example on a reactor, the fuel material’s own matrix structure (which tends to prevent much of the radioactivity escaping from within it), the sealed metal cladding material surrounding the fuel (which also prevents the release of radioactive materials), the reactor coolant circuit (which is designed to have very low levels of leakage) and any additional containment systems around the reactor (that provide a final barrier to any radioactive releases).
5. In addition a nuclear facility will include **safety and protection systems** to protect the functioning of these engineered barriers. Where practicable, there will be systems in place to terminate processes if necessary. In a reactor, for example, there will be multiple systems that will shut down the nuclear chain reaction (and so reduce the rate of heat production) and ensure the necessary cooling is maintained even under conditions where equipment has been disabled or has failed.
6. **Safety management systems**, such as the application of quality assurance procedures, adherence to strict operating rules and the requirement for staff to be authorised following extensive training, add a further level of safety by ensuring operation is carried out within set limits.
7. Nuclear operators also work to promote a strong **nuclear safety culture** within which all those who influence nuclear safety understand its importance and are encouraged to exhibit and promote a questioning attitude. As well as complying with the statutory safety requirements for a UK nuclear site, many UK sites are subject to regular peer reviews from international teams who will challenge any gaps between their observations and defined levels of excellence.
8. **Hazard potential** refers to the potential scale of harm that could arise from a facility if its safety systems were to fail. The measures described above are used to reduce the likelihood that this will happen – that is they affect the **risk** of harm from a facility. The greater the hazard potential, the more stringent are the safety precautions and the required standards to protect people by reducing the risk that the hazard potential within the facility will ever be realised and so cause harm to people.
9. Because of this approach to nuclear safety, the most likely outcome of a serious malfunction at a nuclear plant would be that no member of the public would be

harmful at all, because at least one of the safety barriers or systems would act so as to prevent the event from developing to the stage where a significant release of radioactive material takes place. It follows that, in order for an emergency to pose a radiation risk to the public, it is necessary for some initiating fault to occur together with subsequent failures within the safety systems that protect the public. In nuclear safety analysis such a chain of events is called a “**fault sequence**”.

Nuclear Safety: Regulation and its impact on offsite risk

10. Civil nuclear sites in the UK must be licensed under the Nuclear Installations Act 1965. When a “**site licence**” is granted by the Office for Nuclear Regulation (ONR) a number of “**Licence Conditions**” are attached, which the ONR uses to aid in regulation of safety on the nuclear site. The ONR requires that operators of nuclear installations, among other requirements, carry out a detailed safety analysis of any proposed facilities on their site. This analysis identifies fault sequences which could lead to emergencies or other hazardous situations, including the release of radioactive materials. The analysis examines a very wide range of fault sequences including events that are caused by mechanical failures, human errors, and outside events that may pose a threat to a nuclear facility (such as a loss of external power supplies, aircraft crash or extreme weather). The objective of the analysis is to show how the hazard potential within the facility is safeguarded so that the risk to the public is very small. The analysis that is carried out to underpin this is called the **safety case** for the facility.
11. Because the safety cases examine fault sequences that may involve extreme events and/or multiple failures of equipment, some fault sequences will be identified that could theoretically result in the release of radioactivity. For these fault sequences the amount of any release is calculated and this is then used to determine the possible consequences to a person who could conceivably be exposed. The health risk following exposure to radioactive material depends on the **radiation dose** received and this can be calculated for a person in the location where this would be at its maximum level.
12. The UK system of regulation is ‘goal setting’ – that is there is no specific, prescriptive level which is defined as ‘safe’. Instead businesses are required to reduce hazards **as far as is reasonable practicable**, and the ONR expects that nuclear operators will demonstrate this by undertaking continuous improvement in safety systems on their sites. The ONR gives its Inspectors guidance when inspecting an operator’s safety systems, which are set down in ONR’s **Safety Assessment Principles** (SAPs). Within the SAPs are a set of defined “Basic Safety Objectives” and “Basic Safety Limits” which provide guidance on assessing the scale of a potential radioactive release, which ONR would use when considering whether to grant a nuclear site license or to permit a particular activity.
13. The **Basic Safety Limits** and **Basic Safety Objectives** within ONR’s SAPs are illustrated in the Figure 1. The height of each “bar” in the diagram below represents the “chance” of there being a release of radioactivity which could give rise to a radiation dose at the site fence in the range shown at the base of the “bar”.
14. The vertical line shown on the graph indicates the scale of release above which short-term urgent offsite countermeasures would be likely to be justified in offsite

areas (although the precise point would depend on the nature of the release and how close to the site fence people were located).

15. As Figure 1 shows, ONR's Safety Assessment Principles targets should (if they are met) ensure that the likelihood of an emergency at a UK nuclear plant requiring short term, urgent offsite countermeasures to be implemented is very small. Depending on whether the upper or lower frequency target was met by the facility, the chance would be between one chance in 1,000 per year and one chance in 100,000 per year.

ONR Safety Assessment Principles Frequency/Dose Targets for Public

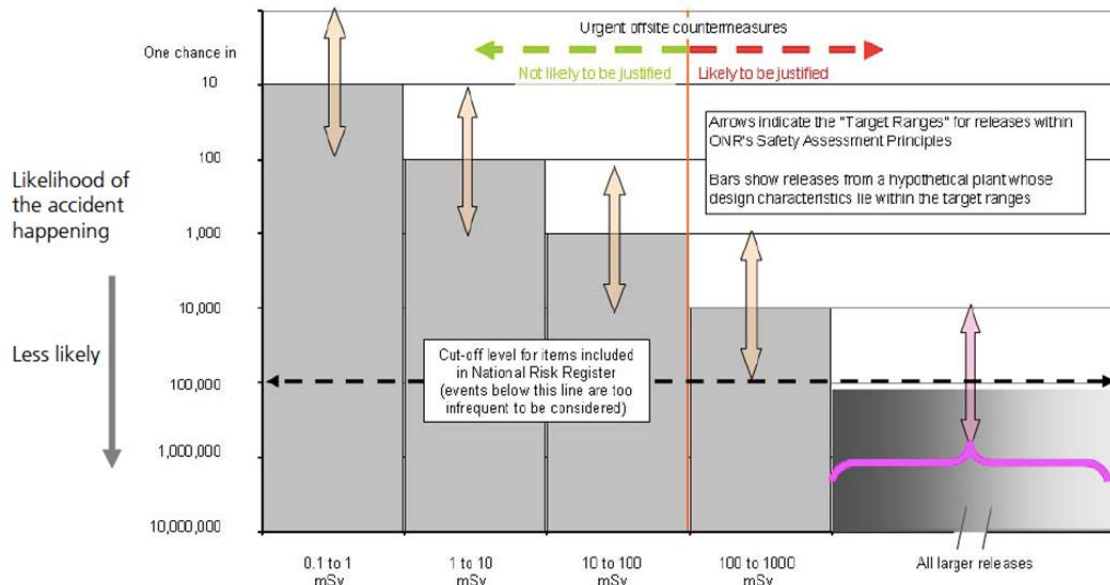


Figure 1 ONR Safety Assessment Principles Frequency / Dose Targets for Public

16. This UK approach to nuclear safety places priority first on preventing fault sequences that could result in a release of radioactivity; second, on mitigating the scale of any radioactive release so its offsite impact is too small to justify short term, urgent countermeasures; and lastly, for those very unlikely events that remain and which could have a significant offsite impact, on providing effective emergency arrangements to protect those members of the public who could conceivably be affected by a release.
17. In addition to the above, the Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPiR) require that nuclear operators undertake a "**Hazard Identification and Risk Evaluation**" (HIRE) to assess all possible radiation emergencies on their site. Where it is identified that there it is "**reasonably foreseeable**" that there could be a "**radiation emergency**" caused on the site, then detailed on- and off-site plans must be prepared to deal with all such events. What constitutes a radiation emergency is defined in REPPiR, however broadly speaking as leading to an off-site radiation hazard to the public. A "reasonably foreseeable" event would be one which is less than likely but is still realistically possible.

18. In practice there are likely to be many potential fault sequences which could lead to an off-site hazard with respect to a particular nuclear site. Therefore the general approach within the UK is to identify the “**reasonably foreseeable**” radiation emergency which could lead to the largest possible consequences and then use this as a bounding case in order to develop detailed emergency plans to deal with the on- and off-site consequences. The worst “reasonably foreseeable” radiation emergency is sometimes referred to as the “**Reference Accident**”.
19. Although the Reference Accident plays a role in providing a broad base against which planning can take place, emergency plans need to be flexible enough to deal with a wide range of potentially possible events. The Reference Accident simply represents the worst off site release that is “reasonably foreseeable” and hence could pose the most significant radiological hazard to people off site.
20. Emergency planning needs to be capable of responding to radiation emergencies which, although extremely unlikely, could have consequences beyond the bounding case of the Reference Accident. The measures which are required cannot be precisely pre-planned because the nature and potential consequences of emergencies can vary, for example due to weather conditions, and the exact response must be based on an assessment made at the time. It is therefore important that emergency plans incorporate arrangements for ‘extendibility’ – that is that an emergency plan should be extendible to provide rapid and effective mitigation for radiation emergencies which could occur, but the likelihood of which is so remote that detailed emergency planning against their consequences is not justified – see Part 1 section 3.6 of the guidance for more information.

Annex D: Approach for carrying out an extendibility assessment

Preparing for an extendibility assessment:

1. The local authority, as lead duty holder under REPPiR for reasonably foreseeable emergencies, should confirm with the relevant operator(s) whether there are any scenarios, identified in the REPPiR Hazard Identification and Risk Evaluation (HIRE), going beyond those identified as being reasonably foreseeable that would warrant consideration of further emergency planning for measures beyond those set out in the current REPPiR detailed plan.
2. Where there are potential scenarios identified the local authority should consider whether to carry out an extendibility assessment and develop an extendibility plan. Where a local authority decides to develop an extendibility plan it should contact DECC for civil sites in England and Wales and Scottish Government for civil sites in Scotland. They should contact MOD for UK defence sites who can provide support and any further advice.
3. The local authority may find it beneficial to develop local GIS data around the site to provide information on the population, commercial facilities, potential vulnerable groups etc. ahead of the local extendibility assessment. This information together with information provided by the operator data will allow the local authority to identify the potential areas that could be affected and what protection measures, including urgent health protection countermeasures, could be implemented in response to a beyond reasonably foreseeable radiation emergency.
4. The authority should then convene a meeting of the relevant emergency planners that would be necessary to carry out the extendibility local assessment.

Carrying out an extendibility assessment:

5. An assessment should be made whether it would be reasonably practicable and worthwhile to extend current local emergency protection measures. Where protection measures are deemed to be practical and worthwhile they should be recorded in a summary.
6. The potential scale of emergencies will vary from site-to-site, depending on various factors including the types of nuclear facility, local demography, geography, and weather. These factors will also be relevant in determining what emergency planning measures are reasonably practicable.
7. The site operator will draw on the safety case assessment work it carries out for ONR under the site licence to provide advice on potential hazards, including timescales and distances for these, for beyond reasonably foreseeable radiation emergencies identified for their facility. In addition the local area should seek advice from an independent radiation health expert to inform their decision on what justifiable public health countermeasures should be implemented. PHE provide such advice to local areas for reasonably foreseeable radiation emergencies and could assist local authorities by providing similar advice to inform the extendibility assessment.
8. The local area extendibility assessment should work incrementally outwards, on a sectorial grid pattern, from existing arrangements within the current detailed emergency plan. Local emergency planners should make an assessment of what protection measures would be reasonably practicable to implement in defined sectors.

9. The protection measures may be an extension of arrangements in the current detailed emergency plan, include protection measures not required in the current plan for reasonably foreseeable radiation emergencies, or draw on other arrangements developed locally under the Civil Contingency Act, if necessary calling on practical support from regional or national resources.
10. Where the assessment shows that practical and worthwhile protection measures can continue to be delivered beyond those in the detailed plan a maximum distance of 30km beyond the site is suggested for the assessment.
11. The local extendibility assessment therefore considers:
 - the information presented by the operator;
 - measures that are reasonably practicable to implement in the local area;
 - how the measure would be implemented – linking to existing processes;
 - how long the measure would take to implement; and

How no further reasonably practicable and/or worthwhile protection measures could be implemented within further sectors; or

 - a distance of 30km from the site boundary has been reached: and
 - How long the measure could be maintained for.
12. The assessment will be complete when it has been assessed that either:
 - no further reasonably practicable and/or worthwhile protection measures could be implemented within further sectors; or,
 - a distance of 30km from the site boundary has been reached.
13. Local authorities should record a summary of their assessment. This can be less prescriptive than the detailed plan and may simply be a tabulated summary showing:
 - What protection measures are assessed as reasonably practicable and potentially worthwhile for a particular sector given the time it is estimated would be required for their implementation;
 - How the identified protection measures are linked to existing arrangements either within the detailed plan or generic local plans developed under the Civil Contingencies Act: and
 - Where external / national processes will be drawn on and how these would be obtained (such as accessing the national stale iodine stockpile).

Annex E: Exercise Matrix

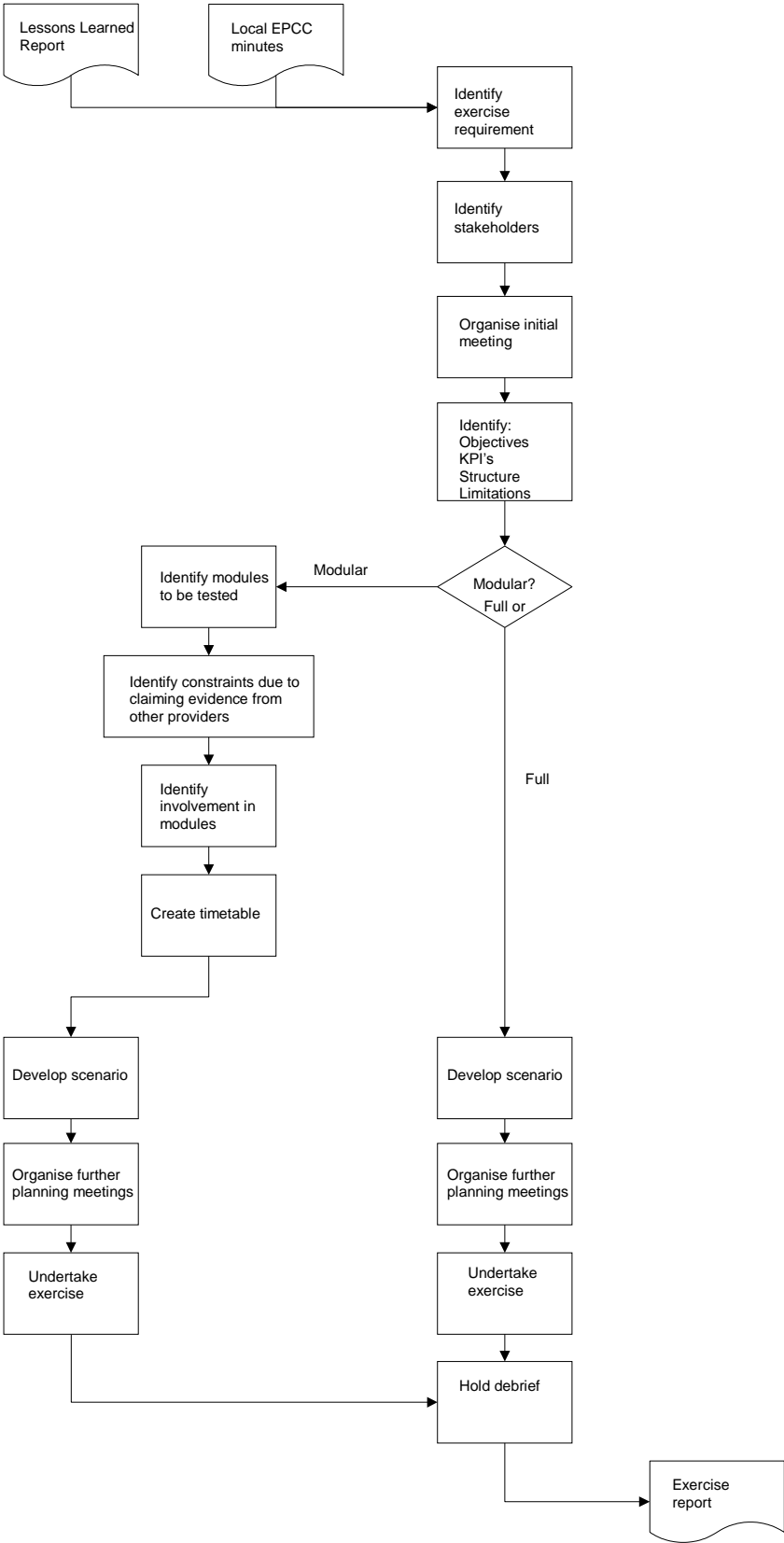
Part of plan	Key elements of arrangements to be tested	Last tested
Scope of hazard	Reasonably foreseeable radiological release Beyond design basis radiological release	
	Type of release (e.g. gas / liquid)	
Meteorology	Real weather Simulated weather	
Initiating events	Failure of the plant's safety case	
	Security threats (e.g. protesters, internal/insider, terrorist)	
	Coincident hazards (e.g. power disruption, disorder, infrastructure loss, flooding (refer to Community Risk Register))	
Notification	In office hours Out of office hours (including bank holidays and weekends)	
	No notice Prior notice (i.e. prearranged notification)	
	Responders pre-positioned at response location (if prior notice) Responders deploying from base	
Response working patterns	Real time Simulated time	
	In office hours Out of office hours (including bank holidays and weekends.)	
	Single day Multi day	
	Shift change/ handovers (particularly if multi day)	
Mutual support from Cross Border national/regional organizations.	Interface with local Strategic Coordination Centres (SCCs)	
	Sub-national/local organisational	

	interoperability	
	National government interoperability	
	Nuclear operator to nuclear operator mutual aid (e.g. technological & radiological)	
Government and National Agency interfaces.	Operation of RIMNET/radiological prediction (Met Office/DECC)	
	National/local interface (e.g. through a Government Liaison Officer (GLO)/Government Liaison Team (GLT))	
	Central government interfaces	
	Environmental Radiation Monitoring support and coordination arrangements (PHE)	
	Interface with other agencies (e.g. Met Office and Food Standards Agency/Scotland (FSA / FSS))	
	International alerting	
	Local politician interface	
Decision making for the Protection of the Public (e.g. regarding use of countermeasures & their impact)	Alerting, warning and informing the public (including provision of reassurance information)	
	Sheltering	
	Initial evacuation	
	Issuing of stable iodine tablets	
	Food restrictions	
	Cordons/access control to contaminated areas	
	Public health advice (including advice on use of water)	
	Reassurance monitoring	
	Reception Centres	
Implementation of countermeasures to protect the public (simulation as appropriate)	Sheltering	
	Initial evacuation	
	Issuing of stable iodine tablets	

	Food restrictions	
	Cordons/access control to contaminated areas	
	Public health advice (including advice on use of water)	
	Reassurance monitoring	
	Reception Centres	
Irradiation contaminated casualty handling (simulation as appropriate)	Radiological protection of response staff (including exposure control)	
	Casualty transport arrangements	
	On-site casualties	
	Off-site casualties	
	Availability of receiving hospitals	
	Contamination of vehicles	
	Treatment of contaminated casualties	
Media Strategy and Coordination and communication	Establishment and operation of Strategic Media Advisory Cell (SMAC) / Media Co-ordination Cell	
	Preparation of public information for use by the media	
	Coordination between local organisations and the operator	
	Setting up and operation of Media Briefing Facilities	
	Interface with national media communications arrangements	
	Social media	
Strategic Coordination	<p>Setting up and operation of the Strategic Coordination Centre (SCC), including:</p> <ul style="list-style-type: none"> • Strategic Coordinating Group (SCG) • Scientific and Technical Advice Cell (STAC) • Strategic Media Advisory Cell (SMAC) • Media Briefing Centre (MBC) 	

	<ul style="list-style-type: none"> Recovery Working/Coordinating Group (RWG/RCG) 	
	Virtual SCC (e.g. using teleconference facilities)	
	Decision making process to protect and reassure the public	
	Communication with national level (e.g. central government departments and agencies)	
	Communication with the tactical level	
Tactical Coordination	Delivery and coordination of tactical activities	
	Interface with Site Emergency Control Centre (SECC)	
	Interface with the Central Emergency Support Centre (CESC) (as appropriate).	
Operational Coordination / Forward Command Post	Delivery and coordination of operational activities	
Provision of Technical Information	Operation of STAC	
	STAC and SAGE Interaction.	
	Operation of company technical support team	
	Recovery coordination	
	Insurance and loss adjustment	

Annex F: Exercise Planning Process



Annex G: Standard Agenda Template (for first Planning Meeting)

1. Purpose: To consider the type of exercise to be undertaken, real or modular, objectives, scope and management.

2. Agenda:
 - Introduction
 - Requirement for an off-site exercise
 - Types of off-site exercise available
 - Feedback from last off-site exercise
 - Other nuclear or generic exercises / events
 - Consideration of exercise type and format
 - Full
 - Modular
 - Implications of each type of exercise
 - Scope of exercise
 - Scenario
 - Management of exercise
 - Objectives
 - Timetable
 - Nuclear Emergency Exercise Programme
 - Local/National emergency planning programme
 - AOB

Annex H: Exercise Order template

1. Operational orders will vary in size and content according to whether a full or modular exercise is being undertaken and whether a local or national off-site exercise is being undertaken.
2. The following contents list should provide a list of what needs to be considered in putting together an operational order:
 - **Front cover** – standard company report front cover identifying exercise name, date of exercise, and approval
 - **Executive summary** – 2 – 3 paragraphs consisting of:
 - Why exercise is being undertaken
 - What organisations are involved; and
 - Identifying that a report will be produced for management of any outcomes
 - **Contents list**
 - Sections
 - Appendices
 - Figures
 - Drawings
 - Bibliography
 - Abbreviations
 - **Introduction**
 - Why is the exercise being undertaken
 - Name of the exercise
 - What organisations are involved (link to appendix 1)
 - **Scope**
 - General objectives of exercise (link to appendix 2 for detailed objectives of each organisation)
 - Aims
 - Exercise envelope e.g. only building x, or whole Emergency Response Organisation, simulations to be used
 - Identify any anomalous activities, e.g. normal operations or maintenance
 - Identify performance criteria
 - Exercise matrix
 - **Scenario**
 - Brief outline identifying the key features e.g. only building x, criticality or major fire, casualties
 - Detailed scenario description (this should refer to: appendix 3 for onsite information, appendix 4 for off-site support information and appendix 5 for additional information)
 - Expected timeline refer to appendix 7
 - **Exercise Management**
 - Identify the process for terminating an exercise in the event of a real event, code phrases e.g. No duff gen. exercise abort
 - Driving script, refer to appendix 6
 - Identification of umpires/assessors/observers by name and use of tabard or armband etc.
 - Detail how umpires/assessors/observers will behave
 - Identify exercise director, responsibilities of exercise director and how to communicate with them
 - Identify use of driving cell and how it will operate

- Risk Assessment
- **Exercise reporting**
 - Identify process of hot debrief followed by a cold debrief, where applicable
 - Establish when the exercise report will be produced by
 - Identify how the internal and external actions will be monitored
 - Identify ownership of the exercise report
- **Appendix 1**
 - List all organisations involved
- **Appendix 2**
 - List detailed objectives by organisation
- **Appendix 3**
 - On-site radiological contour diagrams, by time
- **Appendix 4**
 - Off-site radiological contour diagrams, by time
- **Appendix 5**
 - Other information
 - Source term
 - Plant diagrams
 - affected area
 - Casualties, name, injuries
- **Appendix 6**
 - Driving Script
 - Time, From, To, Input, Response, Feed to other exercise driver Y/N
- **Appendix 7**
 - Expected timeline
 - Key activities and when they are expected to occur

Annex I: Exercise Assessment

Definition of a Performance Indicator

1. Two types of performance indicator exist:
 - Quantitative – these indicators can be assessed by measurement; this might be time, number, dose.
 - Qualitative – these indicators are to do with the feel of the activity or exercise. They cannot be measured but are more to do with where on a range of experiences the assessor considers the activity or exercise lies.

Assessment Criteria

2. Essentially, there are two levels of assessment criteria that can be developed. The first is response plan driven and is bounded by the objectives of the emergency response plan e.g. issue stable iodine tablets, set up Strategic Coordination Centre (SCC), acquisition of environmental monitoring data. These will mostly be objective. The second level of assessment criteria may be exercise driven where the focus is on a particular aspect of the response plan e.g. environmental monitoring, Media Briefing Centre (MBC), SCC interactions, or some new activity that is being trialled in the exercise for the first time. These will mostly be subjective.
3. To turn response plan objectives into assessment criteria some form of performance indicator has to be assigned to it. For example:
 - Issue stable iodate complete inner zone in 2 hrs
 - Complete outer zone in 6 hrs
 - Acquisition of monitoring data Receive Dose estimate within 1hr
 - Receive X monitoring results within 2hrs
 - Receive RIMNET results within 3hrs
 - Set up SCC established in 1hr.
 - SCC operational in 2hrs
4. To turn exercise driven objectives into performance criteria, again requires some form of performance indicator. These may be less tangible than response plan objectives and the performance indicator will need careful consideration to ensure that it is appropriate. For instance, developing a performance indicator for “Appropriate Interaction (Team Working)” in the SCC would be difficult. This would be a subjective assessment.

Annex J: Assessment Form

1. This document covers off-site exercises. It identifies the areas of assessment for off-site exercises providing definition of the areas, measures and success criteria.
2. The assessment team should use the table shown below for assessing the adequacy of the emergency arrangements. This will provide a standard assessment for all off-site exercises.

ACTION	DEFINITION	KEY ELEMENTS	MEASURES / SUCCESS CRITERIA	POOR	ADEQUATE	GOOD
Notification	Alerting external responders	Pre-determined list/notification chains for each declaration status Arrangements for confirmation of receipt Documented process Availability and access to equipment (dedicated or otherwise) Failure procedures Out of hours arrangements	Timeliness Accuracy of information Follow the plan/procedures Equipment performance			
Comments						
Set up of SCC						
Comments						
Supply of Information to SCC						
Comments						

ACTION	DEFINITION	KEY ELEMENTS	MEASURES / SUCCESS CRITERIA	POOR	ADEQUATE	GOOD
Interpretation of Information at SCC						
Comments						
Interfaces and exchanges / team working						
Comments						
Strategic Decision Making						
Comments						
Communications & Public Information						
Comments						
Facilities & Equipment						
Comments						
Participants						
Comments						

Annex K: International Nuclear and Radiological Event Scale

INES

THE INTERNATIONAL NUCLEAR AND RADIOLOGICAL EVENT SCALE

GENERAL DESCRIPTION OF INES LEVELS			
INES Level	People and Environment	Radiological Barriers and Control	Defence-in-Depth
Major Accident Level 7	<ul style="list-style-type: none"> Major release of radioactive material with widespread health and environmental effects requiring implementation of planned and extended countermeasures. 		
Serious Accident Level 6	<ul style="list-style-type: none"> Significant release of radioactive material likely to require implementation of planned countermeasures. 		
Accident with Wider Consequences Level 5	<ul style="list-style-type: none"> Limited release of radioactive material likely to require implementation of some planned countermeasures. Several deaths from radiation. 	<ul style="list-style-type: none"> Severe damage to reactor core. Release of large quantities of radioactive material within an installation with a high probability of significant public exposure. This could arise from a major criticality accident or fire. 	
Accident with Local Consequences Level 4	<ul style="list-style-type: none"> Minor release of radioactive material unlikely to result in implementation of planned countermeasures other than local food controls. At least one death from radiation. 	<ul style="list-style-type: none"> Fuel melt or damage to fuel resulting in more than 0.1% release of core inventory. Release of significant quantities of radioactive material within an installation with a high probability of significant public exposure. 	
Serious Incident Level 3	<ul style="list-style-type: none"> Exposure in excess of ten times the statutory annual limit for workers. Non-lethal deterministic health effect (e.g., burns) from radiation. 	<ul style="list-style-type: none"> Exposure rates of more than 1 Sv/h in an operating area. Severe contamination in an area not expected by design, with a low probability of significant public exposure. 	<ul style="list-style-type: none"> Near accident at a nuclear power plant with no safety provisions remaining. Lost or stolen highly radioactive sealed source. Misdelivered highly radioactive sealed source without adequate procedures in place to handle it.
Incident Level 2	<ul style="list-style-type: none"> Exposure of a member of the public in excess of 10 mSv. Exposure of a worker in excess of the statutory annual limits. 	<ul style="list-style-type: none"> Radiation levels in an operating area of more than 50 mSv/h. Significant contamination within the facility into an area not expected by design. 	<ul style="list-style-type: none"> Significant failures in safety provisions but with no actual consequences. Found highly radioactive sealed orphan source, device or transport package with safety provisions intact. Inadequate packaging of a highly radioactive sealed source.
Anomaly Level 1			<ul style="list-style-type: none"> Overexposure of a member of the public in excess of statutory annual limits. Minor problems with safety components with significant defence-in-depth remaining. Low activity lost or stolen radioactive source, device or transport package.
NO SAFETY SIGNIFICANCE (<i>Below Scale/Level 0</i>)			

Annex L: Welsh Government Arrangements

Legal Position

1. In the event of a radiation emergency in Wales, the UK Government is responsible for overall policy and strategy, and command and control mechanisms will remain through Police Gold and local mechanisms.
2. Responsibilities of the Welsh Government would include:
 - keeping the Minister and other members of the Welsh Cabinet fully informed of all aspects of the management of the emergency;
 - helping keep local and other authorities, and the public informed;
 - advising central government on any adjustments to priorities or redeployment of resources necessary to meet Welsh needs; and
 - Acting as a central reporting point for local agencies where this can assist central government.

Contingency Planning and Response

3. In response to a radiation emergency affecting Wales, the Welsh Government would activate its Emergency Coordination Centre (Wales) (ECC (W)). The ECC (W) could be linked with all Strategic Coordinating Groups (SCGs) in Wales and, where required, the central government crisis management machinery facilitated by the Cabinet Office (COBR).
4. The role of the ECC(W) would be to:
 - co-ordinate the gathering and dissemination of information across Wales;
 - ensure an effective flow of communication between local, pan-Wales and UK levels, including the co-ordination of reports to the UK level on the response and recovery effort;
 - brief the Lead Official for the response in Wales and the Wales Civil Contingencies Committee (WCCC);
 - ensure that the UK input to the response is co-ordinated with the local and pan-Wales efforts;
 - provide media and community relations support through the Welsh Government Communications Division;
 - assist, where required by the SCGs, in the consequence management of the emergency and recovery planning;
 - facilitate mutual aid arrangements within Wales and, where necessary, between Wales and the border areas of England; and
 - Raise to a UK level any issues that cannot be resolved at a local or Wales level.
5. The ECC (W)'s role would primarily be one of information gathering and keeping Welsh Ministers and the UK Government informed of the implications of an emergency in Wales. At the same time, it would keep the SCGs in Wales and individual agencies informed about developments at the UK level which would affect them. It would also offer assistance, where

possible, to SCGs in Wales, particularly in respect of consequence management and recovery issues.

6. The ECC (W) could be used as a means of co-ordinating a multi-agency response by including external partners whose presence in the centre facilitates links with external agencies and draws experience and expertise into the assessment of information being gathered. On these occasions, the Welsh Government would use the centre to facilitate its own response and deal with consequence management issues relevant to its functions whilst also co-ordinating a wider multi-agency response.
7. Where required, the ECC (W) would report for Wales as a whole to the central government crisis management machinery facilitated by Cabinet Office, though other agencies would maintain specific reporting lines, and would provide briefing and advice to Welsh Ministers. The ECC (W) would also act as a mechanism for disseminating information from the central government crisis management machinery to the SCGs.
8. The WCCC would be convened in response to a radiation emergency affecting Wales that required urgent pan-Wales co-ordination or support. The WCCC is an advisory body comprising senior Departmental representatives of the Welsh Government and senior representatives from responder agencies (including members of the Wales Resilience Forum) who can best assess and advise on a particular emergency affecting Wales.
9. The role of the WCCC would be to:
 - to maintain a strategic picture of the evolving situation within Wales, with a particular (but not exclusive) focus on consequence management;
 - to support the GLT at the SCG;
 - to assess and advise on any issues which cannot be resolved at a local level and which may need to be raised at a UK level;
 - to advise on the deployment of scarce resources across Wales by identifying pan-Wales priorities; and
 - To advise on the use of existing legislation and, in some cases, to consider the use of additional powers through the UK Government.
10. The Welsh Government would send a representative to the DECC Emergency Operations Centre, or MOD HQ Defence Nuclear Emergency Organisation, if required.

Annex M: Scottish Government Arrangements

Legal Position

1. The Scottish Government is the LGD in the event of an emergency at a civil nuclear site in Scotland.
2. In the event of a defence radiation emergency in Scotland, MOD is the Lead Government Department. However, the Scottish Government will lead on public protection and the off-site consequence management aspects. Both administrations will work closely together.
3. In the event of a terrorist attack on a nuclear asset/site, the Home Office will be appointed LGD during the Counter-Terrorism phase.

Contingency Planning

4. On notification of a radiation emergency, the Scottish Government would activate its emergency response arrangements, and set up its emergency room – Scottish Government Resilience Room (SGoRR).
5. SGoRR will be staffed on a 24-hour basis if necessary, and the following will be expected to participate in SGoRR meetings, as appropriate:
 - SG Resilience;
 - SG Communications;
 - SG Environmental Quality;
 - SG NHSScotland Resilience;
 - SG Public Health;
 - SG Rural Payments and Inspections;
 - SG Animal Health and Welfare;
 - Animal and Plant Health Agency (APHA)
 - Office of the Chief Scientific Adviser for Scotland;
 - SG Drinking Water Quality;
 - SG Security and Counter Terrorism
 - Scottish Environment Protection Agency (SEPA)
 - Food Standards Scotland (FSS)
 - Transport Scotland;
 - ONR;
 - DECC;
 - PHE-CRCE;
 - MOD; and
 - SCC – Strategic Co-ordinating Group lead/Recovery Group Lead

Response

6. The main functions of the Scottish Government will be to:
 - provide strategic national direction;

- capture and maintain situational awareness of the emergency, and brief Ministers;
- liaise closely with other Government Departments, agencies and organisations close to the affected site, such as police, fire service and local authority, on measures being taken to protect the public and make the site safe again;
- be the main source of information from central Government to the public and media;
- liaise with, and provide up-to-date information to DECC or the MOD to ensure that UK Ministers are briefed on the emergency;
- support response and recovery efforts as appropriate, including appropriate allocation of national resources;
- provide the focal point on public health and NHS resilience issues at national level;
- provide advice and support activity to minimise the impact of radiation on food production and water supply; and
- deploy a Government Liaison Officer (SGLO) to the SCC to support responders, act as the principal conduit between the SCC and government officials or Scottish Ministers, and to provide general government-related advice and support.

Emergency Powers

7. Under the Civil Contingencies Act, Scottish Ministers can request that emergency regulations be made in Scotland. Such a request would normally be made through the relevant UK Lead Department (i.e. DECC) - or Cabinet Office if it is a cross-departmental issue - and in conjunction with the Scotland Office as appropriate. The UK Government will consider such a request, and communicate its response to the Scottish Ministers as rapidly as possible. Section 29(1) of the Act provides that emergency regulations which relate wholly or partly to Scotland may not be made unless a senior Minister of the Crown has consulted the Scottish Ministers (although this requirement to consult may be disapplied by reason of urgency). Any emergency regulations made should reflect normal legislative and administrative responsibilities within Scotland and be compatible with the Scotland Act 1998.

Annex N: Overseas Arrangements

Purpose

1. The purpose of this Annex is to set out the arrangements that would be implemented in the UK and its Overseas and Dependent Territories in response to a radiation emergency occurring overseas.

Scope

2. This Annex outlines the UK domestic response to an overseas radiation emergency arising from Civil Nuclear Facilities, Transportation of Nuclear Material (including air, shipping, rail or road) or any other radiation emergency (as identified by the INES scale), regardless of cause, which could have a direct or indirect impact on the UK or its Overseas and Dependent Territories. This guidance includes information on:
 - Lead Government Department (LGD) responsibilities;
 - Radioactive Incident Monitoring Network (RIMNET);
 - Response to an overseas radiation emergency; including national Warning Point arrangements, assessment, classification and decision making, and activation of UK response arrangements;
 - Command, control and coordination arrangements, including emergency centres and staffing;
 - Consequence management; and
 - Communications.
3. A radiation emergency overseas could lead to widespread low-level contamination of UK territory at levels that would require intervention by the authorities (e.g. food restriction countermeasures). However, it is considered very unlikely that an overseas radiation emergency would lead to contamination at a level sufficient to represent an immediate threat to human health for the population resident within the UK. Therefore, the need for distribution of stable iodine tablets, evacuation or sheltering within the UK is extremely unlikely.

Lead Government Department Responsibilities

4. DECC has been nominated LGD for co-ordinating the initial UK response to an overseas radiation emergency. The response to any such emergencies will progressively pass through three phases:
 - Alert, Notification and Classification - during this Phase, an immediate assessment is carried out and a decision is made on whether the arrangements set out in this Chapter should be activated;
 - The Response Phase - the actions taken to deal with any immediate effects of an emergency; and
 - The Recovery Phase - the process of rebuilding, restoring and rehabilitating the community following an emergency. (Recovery phase arrangements are contained in Chapter 3 of this guidance).

5. In England and Wales, under arrangements agreed between DECC and the Department for Environment, Food and Rural Affairs (DEFRA), DECC will retain LGD responsibility for the Alert, Notification Classification and Response Phases. LGD responsibility for the Recovery Phase, should it be required and subject to agreement, will pass to DEFRA.
6. The MOD will lead on any operational response, render safe and recover any UK Defence Nuclear Assets deployed overseas together with the cross government coordination aspects of these activities.

Radioactive Incident Monitoring Network

7. A key component of the Government's response arrangements to the occurrence of an overseas radiation emergency with consequences for the UK is a national Radioactive Incident Monitoring Network and information management system (RIMNET). The RIMNET Team is responsible for maintaining, on behalf of DECC, the operational readiness of the RIMNET computer system and emergency response facilities.

Response to an Overseas Radiation Emergency

National Warning Point Arrangements

8. The UK is signatory to international conventions and agreements covering exchange of information in the event of a radiation emergency (see section 19.4). Under these arrangements, DECC acts as the national warning point for inward notifications of an overseas radiation emergency.
9. Formal notification would be received in the Nuclear Incident Room (NIR) via Defra duty room, staffed by members of the RIMNET team. The NIR has continuous (24/7) arrangements for the receipt of alerts and notifications of any overseas radiation emergency no matter where it has occurred. The RIMNET Team is responsible for seeking verification of the details regarding an alert or notification from the International Atomic Energy Agency (IAEA).
10. In addition, RIMNET, with its gamma dose rate monitoring stations, would detect the arrival of airborne gamma-emitting radioactive materials from an overseas radiation emergency thereby providing the country with a second line of defence if the UK has not been notified formally.

Assessment, Classification and Decision Making

11. DECC and the Office for Nuclear Regulation (ONR) have arrangements in place to ensure that a rapid technical assessment of the implications for the UK can be made. On the basis of this assessment and taking advice from other bodies (which is likely to include the PHE and the EA) as necessary, DECC will promptly decide on appropriate level of response.
12. As part of this assessment process, DECC will, upon receipt of an overseas radiation emergency notification; seek expert advice, guidance and forecasts from the Met Office regarding the prevailing weather conditions in order to

make an assessment of whether the UK will be likely to experience impacts from the emergency. If considered likely, the Met Office will supply an estimate of the timescale for the transport of radioactive material from the emergency location to the UK.

13. Based upon the information available, an assessment will be made of the potential consequences posed to the UK environment. For an overseas emergency where the consequences are likely to only affect areas governed by Devolved Administrations, the response arrangements described in this Plan would also apply.
14. Where assessment indicates that an overseas incident will pose no immediate impact within UK territorial borders but potential consequences may exist for other UK interests, DECC, supported by other Government departments and agencies, will maintain a 'watching brief', monitor the situation, and take action as required.
15. Should there be benefit in bringing organisations together in the Technical Coordination Centre (TCC) to ensure supporting agencies have a consistent view of the incident and to consider any actions, the TCC can be established.
16. In the event that RIMNET detects raised dose rate levels, an alerting mechanism will be activated thus notifying the RIMNET Team.

Activation of the UK Response Arrangements

17. Based on the above assessments, the LGD during response will determine an appropriate and proportionate, level of response. If necessary, the following actions will be carried out:
 - Notification messages will be sent to 24 hour contact points in Government Departments and Agencies, Devolved Administrations, and Local Authorities with responsibility for responding to an overseas radiation emergency; and
 - Local authorities will be informed by the usual mechanisms

Central Government Arrangements for Responding to an Emergency

18. The UK central government arrangements for the response to an overseas radiation emergency align with arrangements for the response to any emergency, irrespective of its cause, requiring co-ordinated central government action, with the appropriate level of response, as defined in the National Nuclear Response Concept of Operations, shown in the table below:

Level	Level of Engagement and Key Actions
1	<p>Significant emergency (Level 1)</p> <ul style="list-style-type: none"> • On site emergency that does not pose a radiological hazard beyond the site perimeter. • Narrow focus requiring central government support. • DECC activity is likely to be limited to giving policy advice and guidance to local authorities. • Cross-departmental co-ordination meetings at official level led by DECC with support as required from the Cabinet Office.
2	<p>Serious emergency (Level 2)</p> <ul style="list-style-type: none"> • Has, or threatens, a wide and prolonged impact requiring sustained central government co-ordination. • Central government response led from COBR under the direction of the nominated lead Minister. • SAGE established to provide scientific advice. IMG established to manage wider impacts • The LGD during response in consultation with the LGD for recovery and UK Government (for event in England and Wales) will consider setting up a Recovery Group to oversee recovery activity co-ordinating as appropriate.
3	<p>Catastrophic emergency (Level 3)</p> <ul style="list-style-type: none"> • Has a high and potentially widespread impact and requires immediate central government direction. • Central government response led from COBR under the direction of the nominated lead Minister. • SAGE established to provide scientific advice. IMG established to manage wider impacts • Recovery Group would be set up to oversee recovery activity co-ordinating with the devolved administrations as appropriate. • Other departments might assume the chairmanship of groups addressing specific aspects of the response and recovery effort.

Technical Coordination Centre

19. The TCC's function is to provide technical and scientific advice to support the response to an overseas radiation emergency. This advice will support the decision- making of SAGE and the IMG, if convened, and also officials in the DECC EOC, as well as contributing to the preparation of information and advice bulletins. Key to this advice will be the preparation and regular update of a rolling brief covering key aspects of the response. A senior DECC official will normally chair the TCC, but may delegate this authority to another Government Department or Agency when appropriate (likely to be the PHE or the Environment Agency (EA), depending on the issues to be discussed).

- Organisations that might be invited to attend the TCC include:

- Department of Energy & Climate Change (DECC);
- Public Health England (PHE);
- Environment Agency (EA) / SEPA in Scotland;
- Food Standards Agency (FSA) / Food Standards Scotland (FSS) in Scotland;
- Met Office (including the RIMNET Team);
- Office for Nuclear Regulation (ONR);
- Department for the Environment Food and Rural Affairs (DEFRA) / Scottish Government in Scotland;
- Foreign & Commonwealth Office (FCO);
- Ministry of Defence (MoD);
- Department for Transport (DfT); and
- Devolved Administrations

20. The role of the TCC is to:

- provide coordinated technical and scientific advice, through the chairperson, to the IMG, EOC and other Departments and agencies to support the response to an overseas radiation emergency;
- assemble and share relevant technical and scientific data;
- use available information to arrive, as far as possible, at a common view on the scientific and technical merits of different courses of action;
- consider the existing, immediate and future technical and scientific aspects of the response, including capability and capacity at the UK, local and international levels;
- advise on the technical and scientific quality of available technical and scientific information as a basis for response decision-making and action;
- highlight any technically and scientifically based challenges that may adversely affect the ability of DECC and other Government Departments and agencies to deliver their responsibilities and to manage their response effectively; and
- And provide collated assessments to allow compilation of a rolling brief for use by IMG, EOC and Government departments and agencies.

21. The TCC is likely to consider and advise on the following broad topics, although this list is not exhaustive:

- nature of the emergency, radioactive release and countermeasures;
- forecast effect on the UK or overseas dependent territories;
- sampling and monitoring activities, including RIMNET data;
- local radiation and contamination levels;
- risk assessment;
- potential effects on health and advice to the public;
- effects on food and water;
- effects on the wider environment;
- effects on transport services;
- advice to farmers;
- advice on animal health;

- advice to travellers;
 - control of imports from affected areas; and,
 - And prioritising the use of available resources.
22. Information on these issues will be provided in a rolling brief provided to support the operations of the IMG and EOC.
23. The TCC will be supported by technical assessment centres located away from the TCC based in the offices of individual organisations.

Annex O: Countermeasure Advice Template

OFF SITE COUNTERMEASURE ADVICE –			
Incident Type	SITE INCIDENT*/OFF SITE NUCLEAR EMERGENCY*		
Operator		Site	
Declared at	__:__:__ - 24 hour clock format	Declared on	__/__/__ - dd/mm/yyyy format
Emergency Location		Advice Issued by	Operator/ STAC*
Current Release	<ul style="list-style-type: none"> There has not been any radioactivity released from the site. The public are not at any risk and do not need to take precautions*. There has been radioactivity released from site*. 		
Meteorological Situation (current forecast)	<ul style="list-style-type: none"> The current wind direction is FROM _____ degree towards sectors _____ <div style="text-align: right;"> DRY/RAIN/SLEET/HAIL/ SNOW Depth_____mm </div> <hr style="border: 1px solid red;"/> <hr style="border: 1px solid red;"/> <ul style="list-style-type: none"> The forecast wind direction is FROM _____ degrees towards sectors _____ This change is forecast to occur at __:__(mm:hh) on dd/mm/yyyy <div style="text-align: right;"> DRY/RAIN/SLEET/HAIL/ SNOW Depth_____mm </div> 		

<p>Urgent Countermeasures recommended</p> <p>Delete those <u>not</u> recommended</p>	<p>*Evacuation in sectors _____ out to _____ km</p> <p>*Sheltering in sectors _____ out to _____ km</p> <p>*Take stable iodine tablets in sectors _____ out to _____ km.</p> <p>This advice is based upon precautionary basis/plant status & symptoms/perimeter monitoring/off site monitoring</p>
<p>Prognosis for next 2 to 3 hours</p> <p>(from the time of this advice being issued)</p>	

Countermeasure advice issued at _____ mm:hh on _____ dd/mm/yyyy

By: (Name, block capitals): _____ Signed: _____
 _____ Position: _____

Contact Number: _____

Annex P: Radiation Monitoring

1. The table below provides details of additional guidance and considerations associated with the three key work streams of people, environment & food.

People	Environment	Food
NHS Emergency Planning Guidance 2005	Radioactivity in Food and the Environment, 2010. RIFE 16. Environment Agency, Food Standards Agency, NIEA and SEPA, Bristol, Belfast, London and Stirling.	
NHS Emergency Planning Guidance: the ambulance service guidance on dealing with radiological incidents and emergencies	HPA-RPD-064 - UK Recovery Handbooks for Radiation Incidents: 2009	
HPA-CRCE-017: Radiation Monitoring Units: Planning and Operational Guidance		CEC Council Regulation (Euratom) 2218/89 amending Regulation (Euratom) 3954/87 laying down maximum permitted levels of radioactive contamination in foodstuffs and feeding stuffs following a radiation emergency
HPA-CRCE-014 - Guidance on Screening People for Internal Radioactive Contamination		

Annex Q: Radiation Protection

1. This Annex outlines guidelines on radiation protection for the public and for intervention personnel.
 - **Public.**

IRR 99 limits are suspended by REPIIR and the emphasis of urgent radiation protection actions by the emergency services and public health authorities is to minimise exposures as far as reasonably practicable (ALARP) in keeping with the Emergency Reference Levels published by Public Health England and to avoid any immediate health effects from radiation exposure or the proposed countermeasures.
 - **Emergency Services and other Intervention Personnel.**

Arrangements for the provision of radiation protection advice and the control of exposure to radiation of employees on site are the responsibility of the relevant site operator. The management of emergency exposure during any radiation emergency for identified site intervention personnel is detailed in the relevant On-Site Emergency Plan and follows ALARP principles.
2. Emergency services attending any incident involving radiation, but not a radiation emergency, are classed as radiation workers under IRR 99 when operating and are limited to a maximum annual dose of:
 - Police¹: 5mSv
 - Fire²: 20mSv. Single incident maximum dose of 5mSv
 - Ambulance³: 20mSv
 - CNC: 5mSv
3. During any radiation emergency, occupational radiation protection advice will be provided to the emergency services as follows:
 - Police - Atomic Weapons Establishment
 - Fire & Rescue Service - each FRS has their own arrangements in place to obtain the services of a RPA.
 - Ambulance Service - PHE CRCE
 - CNC – Nuvia
4. Radiation protection advice for staff from PHE CRCE will be provided by this organisations own Radiation Protection Advisors.
5. Emergency exposures are exposures to ionising radiation of intervention personnel which may be necessary to put emergency plans into effect. The

¹ ACPO Guidelines on the Police Service Response to Operations and Incidents involving Radiation dated Oct 2012

² Fire & Rescue Service Operational Guidance - GRA 5.5 Incidents Involving Radiation dated Jan 2011.

³ NHS Emergency Planning Guidance - The ambulance service guidance on dealing with radiological incidents and emergencies dated 23 March 2010.

management framework to be used by agencies with staff identified as being likely to deploy in the event of a radiation emergency is as follows:

- **Pre-Planning**
 - Identify people who can receive emergency exposures.
 - Train and equip people to conduct likely intervention tasks.
 - Have arrangements for medical surveillance and dosimetry.
 - Name those responsible for managing emergency exposures.
 - Specify limits of emergency exposures.
- **Implementation**
 - Check the fitness of people who will receive emergency exposure.
 - Check they are properly equipped and instructed for intervention task.
 - Manage emergency exposures by limiting dose levels except in extreme circumstances to save life.
 - Assess the dose received during emergency exposure.
- **Record Keeping**
 - Ensure dose records are kept by approved dosimetry services.
 - Provide copy of dose record to employee.
 - Report any emergency exposure and resulting action to ONR.

Emergency Exposure Levels.

6. The following emergency exposure levels have been nationally agreed:

- **Police**
 - Up to 100mSv for plant intervention, simple rescue and future dose saving activities.
 - Up to 500mGy for life saving intervention only. This includes intervention to save critical infrastructure which if not attended, may yet threaten public and/or responder life. Authorised by appropriately trained police officer.
 - Other restrictions are in place for pregnant police officers.
- **Fire**
 - Up to 100mSv to save life or maintain critical infrastructure. Authorised by an appropriately trained fire officer.
 - Other restrictions are in place for pregnant fire-fighters.
- **Ambulance**
 - Up to 100mSv for life saving operations where the casualty cannot be immediately removed from the area of high dose rate. Authorised by an appropriately trained ambulance officer.
 - Other restrictions are in place for pregnant ambulance officers.
- **CNC**
 - Up to 100mSv for plant intervention, simple rescue and future dose saving activities.

- Up to 500mGy for life saving intervention only. This includes intervention to save critical infrastructure which if not attended, may yet threaten public and/or responder life. Authorised by appropriately trained CNC officer.

Annex R: REPIR Public Information Requirements

1. Schedule 10 of REPIR specifically requires the following information to be given to the public in the event of a radiation emergency:
 - Information on the type of Emergency which has occurred, and, where possible, its characteristics, for example, its origin, extent and probable development.
 - Advice on health protection measures, which, depending on the type of emergency, might include:
 - any restrictions on the consumption of certain foodstuffs and water supply likely to be contaminated;
 - any basic rules on hygiene and decontamination;
 - any recommendation to stay indoors;
 - the distribution and use of protective substances;
 - any evacuation arrangements;
 - special warnings for certain population groups; and
 - any announcements recommending co-operation with instructions or requests by the competent authorities.
2. Where an occurrence is likely to give rise to a release of radioactivity or ionising radiation has happened but no release has yet taken place, the information and advice should include the following:
 - an invitation to tune in to radio or television;
 - preparatory advice to establishments with particular collective responsibilities;
 - recommendations to occupational groups particularly affected; and
 - If time permits, information setting out the basic facts about radioactivity and its effects on persons and the environment.

Annex S: Supporting recovery guidance

Emergency Response and Recovery Guidance

1. Describes the multi-agency framework for responding to and recovering from civil emergencies in the UK. Chapter 3 includes reference to Civil Nuclear Arrangements and paragraph 3.4.36 states:
2. 'Whilst the REPPiR takes precedence over the Civil Contingencies Act in relation to nuclear emergency preparedness and response, the CCA should be followed in areas not covered by REPPiR.'

Preparing Scotland - Preparing for Emergencies: Recovering from Emergencies in Scotland

3. Examines the nature of recovery, its place in the resilience process and its management. Also explores some of the issues those managing recovery may encounter and how they can prepare for the task.

The UK Central Government Response Concept of Operations (CONOPS)

4. Sets out the UK arrangements for responding to and recovering from emergencies.

National Recovery Guidance (2007)

5. Primarily aimed at local responders and developed in line with the CCA on recovering from an emergency in the UK.

Strategic National Guidance: The decontamination of buildings infrastructure and open environment exposed to CBRN4 materials

6. This provides basic information on the decontamination and remediation that may be required following a deliberate or accidental release in the UK.

Recovery: An Emergency Management Guide, Home Office, 1 January 2006

7. The guide states that the local authority will lead the rehabilitation and reconstruction of the community. Consideration of recovery should be part of day to day emergency management.

National Resilience Capabilities Programme (NRCP)

8. The core framework through which the Government seeks to build resilience to emergencies across all parts of the United Kingdom. This includes recovery as a supporting work stream needed for all types of major incident.
9. The programme has links to CCA duties and associated regulations as it aims to ensure that there is a robust infrastructure in place to deal with a wide range of emergencies.

UK Recovery Handbook for Radiation Incidents, Public Health England, 2015

10. This comprises three handbooks to assist in the management of contaminated food production systems, inhabited areas and drinking water following a radiation incident, which have been developed in conjunction with a wide range of stakeholders. The handbooks are aimed at national and

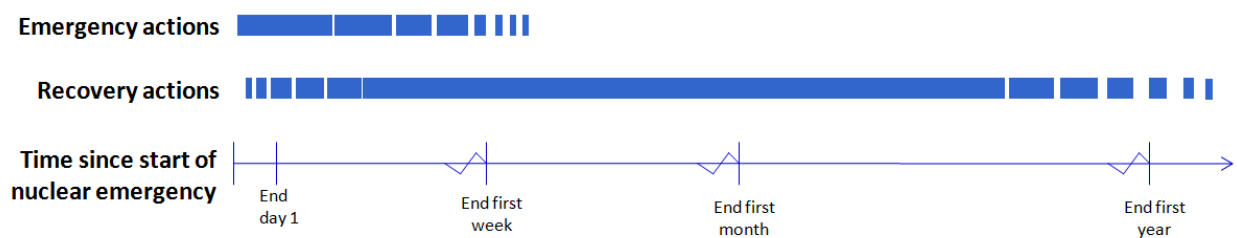
⁴ Chemical, Biological, Radiological and Nuclear

local authorities, emergency services, radiation protection experts, agriculture and food production sectors, the water industry and others who may be affected.

Annex T: Factors informing the decision to hand over co-ordination of the response

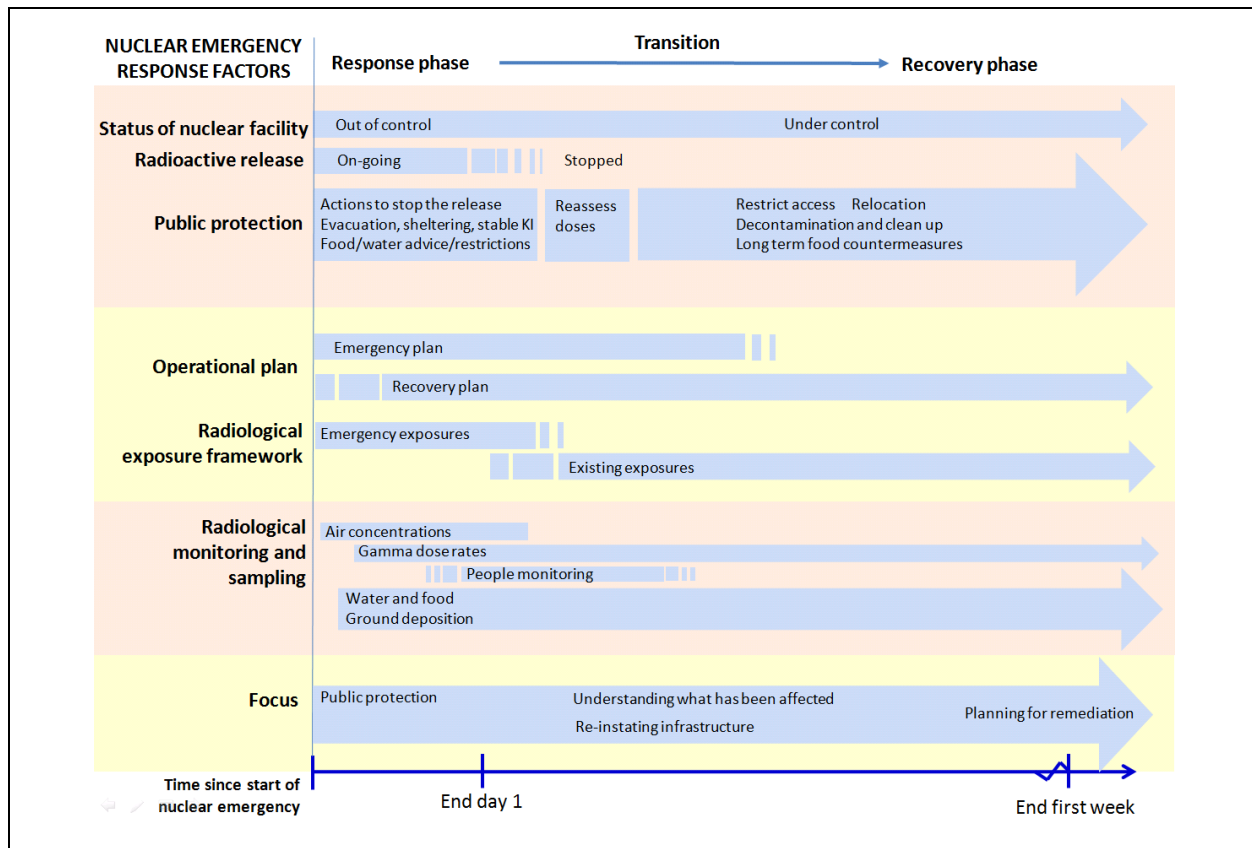
1. The issues arising from a nuclear emergency will influence the criteria for handover of co-ordination from the police to the local authority. The progress made on these issues will influence the timing of handover. Annex T explores how actions to manage the response to a nuclear emergency changes with time so that decisions about when and how to handover co-ordination are better informed.
2. Figure 1 below illustrates how emergency actions take off as soon as the event occurs and will scale down after about a week. However, a resurgence of problems with the nuclear facility or concerns about public order for example, may give rise to further emergency activities later on. A Recovery Co-ordinating Group is likely to be convened on day 1 of the event and activities to support community recovery will be well-established within two to three days. Recovery activities are likely to continue for many months.

Figure 1. Response and recovery actions during the response to a nuclear emergency



3. During the first week or so, there will be a gradual shift in the focus of the multi-agency group. Initial emphasis on emergency issues will decrease with a growing emphasis on actions to support recovery. The pace of change will be dependent on the specific challenges presented by the nuclear emergency.
4. Figure 2 below illustrates how different aspects of the response will progress with time since the start of the nuclear emergency. Nuclear emergency response factors noted in the diagram include:
 - Situational factors including status of the nuclear facility, actions to manage casualties, infrastructure (transport, utilities, health services) and public reaction;
 - Frameworks in place to manage the impact of the event such as emergency or recovery plans;
 - Radiological monitoring; and
 - The strategic focus of the multi-agency group.

Figure 2. How elements of the response to a nuclear emergency change with time, suggesting a transition from the response phase to the recovery phase



Typical features marking the beginning of the transitional phase

- Some aspects of nuclear facility operation may still be out of control.
- Radiation exposures are managed according to the ICRP⁵ framework for *emergency exposure situations*. Experts will be considering recovery actions which will shift dose management towards the application of the ICRP framework for *existing exposure situations*.
- Initial focus on air sampling will have stopped when plume passed. People monitoring (at Radiation Monitoring Units) will be winding down. Environmental radiological sampling and monitoring will be underway to understand the levels and extent of contamination and impact on food and water.
- Up to this point emergency countermeasures will have been in place. At this stage, thought will be given to reassessing doses and efficacy of measures to protect the public.
- There will be minimal involvement of elected local authority members and community leaders at SCG level. This will change during transition.
- Emergency and off-site plans will have been implemented during the response phase. The implementation of the recovery strategy and plans will mark the start of transition.

Typical features marking the end of the transition phase - suggesting recovery is well underway

- Nuclear facility under control – no further release envisaged.
- Radiation exposure to the public managed by 'existing exposure framework'.
- Elected local authority members and community leaders are involved in strategic level discussion.
- Radiological monitoring will be driven by the need to prioritise clean-up operations and provide reassurance concerning food, water and environment.

⁵ International Commission for Radiological Protection.

- | |
|--|
| <ul style="list-style-type: none">• Focus on clean up, restricting access and relocation to manage exposures.• Site emergency Plan and Offsite plans no longer applicable. Recovery strategy and recovery plan for the event have been implemented. |
|--|

5. These important aspects of the response to a nuclear emergency will progress at varying rates depending on the combination of challenges presented by the event and the capability of the responding organisations to deal with them. This means response and recovery actions may occur simultaneously in the same or different geographical locations. Also, some aspects of the response will progress to recovery sooner, or later than others. This suggests a transition to recovery rather than a step change.
6. The decision to handover co-ordination of the response will be assisted by:
 - A broad understanding of how different aspects of the response to a nuclear emergency will progress.
 - The status of each strand of activity as emphasis begins to shift away from emergency issues, compared with the situation later, when recovery is the dominant focus of the multi-agency group. In other words, what we can reasonably expect at the beginning and end of the 'transition'.
 - A Common Recognised Information Picture (CRIP) setting out the status of issues being addressed by the multi-agency response.
7. Whether or not to handover co-ordination is not an exact science. However, by comparing the status of various aspects of the response, with what we can reasonably expect during transition, will provide a measure of 'readiness for handover'.

Annex U: Long term consequences of a nuclear emergency

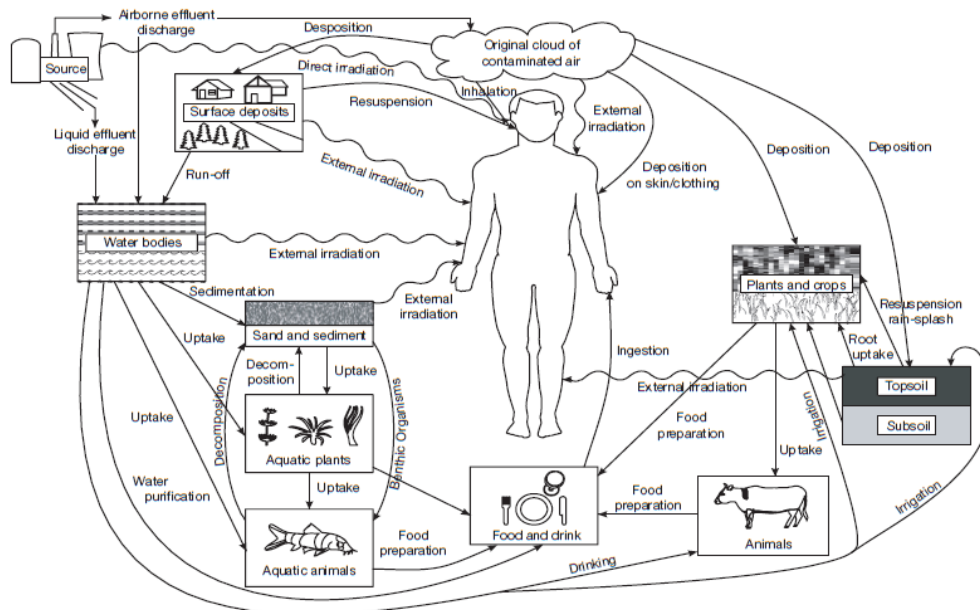
Deposition of radioactive contamination in the environment

1. Following an atmospheric release, deposited radioactivity will be present as surface contamination. Its distribution will be affected by the properties of the contamination and the action of environmental process such as weathering. Material may be found on the surfaces of buildings, roads, open spaces in inhabited areas, on land used for food production and in lakes, reservoirs and the marine environment.
2. Levels of radioactivity on the ground are likely to decrease with distance from the release point. The distribution of radioactivity will be affected by the terrain, human activities, building structures, as well as weather conditions. For example, greater levels of deposition on the ground may be expected where it has rained. Additional factors such as type of radionuclide, its chemical form, soil type or media on which the contamination is deposited, as well as weathering effects (such as rainfall, erosion and resuspension) can change and redistribute the contaminated material over time. The time and rate of change can vary greatly.

Exposure pathways

3. Radioactive contamination in the environment may lead to a range of exposure pathways resulting in radiation exposures to people. Different exposure pathways are important at different times following a release. When the release of radioactivity is on-going, people affected by the plume receive a direct external radiation exposure, as well as an internal exposure from breathing in radioactive materials.

Figure 3. Exposure pathways for members of the public as a result of discharges of radioactive material to the environment⁶



⁶ From IAEA Safety standards for protecting people and environment. Environmental and source monitoring for the purposes of radiation protection. Safety Guide No RS-G-1.8

4. The main potential exposure pathways in the medium to long term are:
 - External irradiation from radioactivity deposited in the environment;
 - Breathing in resuspended radionuclides; and
 - Consumption of contaminated foods.

Factors affecting radiation exposures

5. The importance of the various exposure pathways and radionuclides depends on the type of environment being considered. For example; residential, non-residential, recreational, food production system or drinking water supplies. Identifying the main exposure pathways for a given environment assists in identifying the areas where remediation efforts are most likely to produce significant reductions in doses.
6. Once deposited in the environment, radiation exposures will be dependent on many factors, including:
 - **The levels of contamination**
 - Levels of radioactivity on the ground are likely to decrease with distance from the release point. However, wash out during rainfall or snowfall may lead to 'hot spots' of deposition on the ground.
 - **The type of radioactivity (radionuclides) present**
 - An airborne release of radioactivity arising from an emergency is likely to be dominated by iodine-131 and caesium-137 which are products of the nuclear fission of uranium. The thyroid gland produces hormones containing iodine. The body cannot distinguish between radioactive iodine-131 (half-life 8 days) and stable iodine, the gland which absorbs and stores iodine containing compounds will disproportionately be affected by the radiation, especially in infants and children. In the longer term, exposure may give rise to thyroid cancer. Iodine tablets distributed in the vicinity of nuclear power plants are intended to saturate the thyroid with stable iodine to prevent uptake of the radioactive form.
 - Caesium-137 (half-life 30 years) is present in the form of salts which are highly soluble in water. This means that caesium-137 ions are readily taken up into food stuff grown in contaminated areas and into the body.
 - For nuclear emergencies involving alpha-emitting radionuclides, such as plutonium-239, inhalation of resuspended (contaminated) material is the primary concern.
 - **Radioactive half lives**
 - The rate of radioactive decay is determined by the half-life – the time taken for the amount of radioactivity to reduce by half. Radioactive half-lives can vary between fractions of a second to millions of years, so at any location, the amount of radioactivity present will change over time in line with the radioactive half-life.

- In general, the longer the half-life, the longer the radioactivity will persist in the environment with the potential to deliver a radiation exposure. However, it doesn't necessarily follow that radionuclides with longer half-lives are more of a problem for recovery than radionuclides with shorter half-lives. The most challenging materials are likely to be those with intermediate half-lives, for example, caesium-137, with a half-life of around 30 years. A material with a half-life of a million years is actually not very radioactive because it decays very slowly. However, one with a short half-life decays faster and produces a bigger dose.
- **Mobility of radioactivity in the environment**
 - The length of time a radionuclide presents a health hazard is not simply a matter of its physical half-life. For exposures arising from contaminated food, the speed at which the material is absorbed and immobilised in the environment may be more important.
 - For the most part, the contamination will begin as surface contamination and will generally be uniformly distributed, decreasing in concentration with distance from the incident. However, the uniformity of the initial deposition will be affected by weathering effects such as rainfall, wind, erosion and resuspension as well human activities such as farming activities and vehicle movement which can change and redistribute the contaminated material over time. The redistribution can greatly vary according to the radionuclide and where it has been deposited.
 - Some radionuclides are more mobile than others in the environment. For example following deposition radiocaesium is highly soluble in water and is susceptible to erosion and run off before becoming immobilised in soils. Strontium on the other hand is, in most forms, relatively mobile and can move down the soil column and into ground waters with percolating water.
- **Time since the release**
 - Generally, in the absence of protective countermeasures, the exposure rate would be highest immediately after deposition. Exposures will reduce over time as the radionuclides migrate from exposed surfaces, for example - by the action of water. However, it is possible that subsequent increases in exposure rate could occur due to the movement of radionuclides into closer proximity with people.
 - Time since release is an important factor affecting exposures from materials with short half-lives. For example, iodine-131 which has a half-life of 8 about days. Within a month – which is approximately four half-lives, the concentration will be 16 times lower.
- **The amount of time people spend in the proximity of contamination**
 - The longer the exposure time the greater the radiation dose.
- **Activities undertaken in the contaminated area**

- For planned activities that are particularly prone to raising dust, for example, workers carrying out some decontamination measures or for farmers or others working on the land, it is important to consider the resuspension pathway for all types of deposited radionuclides.
- **Measures in place to manage exposure**
 - For example, restrictions on the sale and marketing of contaminated foods, restricting access to contaminated areas and undertaking clean-up of inhabited areas.

Impact on health and well-being

7. Any exposure to radiation is thought to increase the long term risk of cancer. In most situations, the risk to health is proportional to the amount of radiation dose that someone receives. It is not generally possible to distinguish between cancer that is caused by low level radiation exposure and cancer from other causes.
8. Exposure to high doses of radiation in short bursts can cause illness in addition to the long term cancer risk. The severity of the effects will depend on the type of radiation, the amount of exposure and the exposure situation. Very large exposures can kill but these occur very rarely. They will not be an issue in the recovery phase of a nuclear emergency because health protection measures will already have been implemented to prevent them. Dose assessment during the recovery phase would never involve weighing up exposures that could involve severe health effects.
9. Nuclear emergencies may also have profound psychological impacts on people⁷. These events are unique in part because of the public's intense fear of radiation. In the case of the emergencies at Chernobyl and Fukushima this has led to short, medium, and long term negative effects on health and quality of life, which has manifested itself for example in terms of depression, increased incidence of suicide, alcoholism and relationship breakdowns. There have also been heightened perceptions of social stigma attached to people who were contaminated, or even potentially contaminated, by radioactive materials. The social stigma attached to people exposed to radiation may isolate them and substantially affect prospects for successful long-term recovery.
10. The negative impact may be compounded by the disruption to normal living over prolonged periods of time. This could involve a causal event which alters the lifestyle of affected communities. For example, the seismic event that led to the nuclear emergency at the Fukushima Daiichi nuclear power plant. Disruption may also be caused by relocation of communities, restricting access to contaminated areas or efforts to remediate affected areas. The impacts on normal living, such as going to school, going to work and engaging in leisure activities, may have a significant impact on individual well-being.

⁷ Recovery from Chernobyl and other Nuclear Emergencies: Experiences and Lessons Learnt. United Nations Development Programme Bureau for Europe and the CIS, April 2013.

Impact on the food chain

11. Plants may intercept radionuclides directly on their exposed surfaces or take up contamination from soil through their roots. Animals can be exposed via inhalation or through ingestion of contaminated feed or water. In some circumstances, actions can be taken that reduce the levels of contamination in the final food products to acceptable levels. This may include washing and peeling fruit and vegetables to remove surface contamination. For meat products, ensuring a period of clean feeding prior to slaughter may allow time for contamination to reduce through natural biological processes.
12. Where food is contaminated it can lead to an intake of radioactivity over a long period of time, leading to the build-up of dose. This dose can be reduced by banning the sale of contaminated food. The limits on radioactivity in food are deliberately low to reduce radiation dose to minimal levels. This may result in a wide area being subject to food controls.

Impact on drinking water

13. Reservoirs and rivers or streams used for drinking water supplies can be affected by the runoff from contaminated areas, although dilution of the radionuclides in a large water body greatly reduces concentrations. Processes used routinely in water treatment plants to remove impurities from drinking water will also remove a wide range of radionuclides, some by up to 70 %. Insoluble radionuclides will bind with sediment in the surface water bodies and will not have a significant impact on drinking water supplies.

Impact on business, economy and infrastructure

14. Long lasting radiological contamination is likely to directly affect critical infrastructure (such as utilities, public transportation, communication systems, food and water supplies) which will impact on the local economy (such as businesses and employment opportunities) and key public services (government services, security institutions, medical facilities, financial system, public health services, and education facilities). Psychosocial impacts of the radiation would also be expected to contribute significantly to longer-term deleterious economic outcomes. There may be reluctance to purchase food and other commodities from the affected area due to the stigma associated with radiation. Inadequate economic restoration may lead to permanent outmigration (for reasons apart from health-related considerations), as residents move elsewhere to seek gainful employment, although this is very much dependent on the pre-incident economy of the affected area.

Annex V: The importance of radiological monitoring in defining the situation

1. The Recovery Co-ordinating Group needs to understand the nature and extent of off-site contamination following a nuclear emergency in order to be able set strategic aims, to prioritise remediation and to communicate risks to the public. The characterisation of the radiation contamination will be achieved through a program of radiation monitoring, undertaken by teams of suitably qualified and experienced personnel using specialist equipment. This capability is supported by specialist laboratories that will process any sample, for example of grass, soil, food or water, taken by the monitoring teams.

Radiation monitoring resources

2. The resources for undertaking radiation monitoring and providing laboratory support during recovery from a nuclear emergency may come from many different organisations in the UK. These organisations are not obliged to provide their radiation monitoring resource for use during recovery and do so, on a voluntary basis. Following a nuclear emergency, radiation monitoring co-ordination in the UK is undertaken by PHE CRCE. In this role, PHE CRCE will approach organisations directly, or through their sponsoring government department, to request the provision of radiation monitoring resources for use during recovery.

Radiation monitoring responsibilities

3. Some organisations have specific statutory responsibilities for carrying out radiation monitoring during the recovery phase of a nuclear emergency, as follows.
 - Foods Standards Agency and Food Standards Scotland monitor radioactivity in food to establish and review food countermeasures;
 - Local Authorities undertake monitoring of radioactivity in private water supplies and for the purpose of enforcing food countermeasures.
4. Other organisations have operational responsibilities to act on behalf of, or in support of government departments to provide advice to other relevant participating organisations. For example, Environment Agency and Scottish Environment Protection Agency provide information to Local Authorities, Drinking Water Inspectorate⁸ (DWI), Drinking Water Quality Regulator⁹(DWQR) and water utilities on the status of water in the environment which may be abstracted for private or public drinking water supply. This means providing information on the concentrations of radioactivity in Becquerels per litre (modelled early on/monitored later) in the water in rivers, reservoirs and aquifers that could be affected.
5. Post-incident medical treatment or surveillance of those affected by the incident is outside the scope of the radiation monitoring co-ordination role. This would usually be co-ordinated by the NHS and local public health authorities.

⁸ For England

⁹ For Scotland

Monitoring strategy

6. Once the nature of the emergency and the availability of radiation monitoring resources are known, a monitoring strategy will be developed. This will be based on the strategic recovery aims and take account of monitoring being undertaken by those organisations with a statutory responsibility. In the event that a monitoring subgroup has not been convened, the monitoring strategy will be developed by PHE CRCE in consultation with the other organisations providing monitoring resources. The monitoring strategy will be agreed by RCG and implemented.

Monitoring co-ordination

7. In the response phase of a nuclear (or other radiation emergency), PHE CRCE is responsible for the co-ordination of resources made available for radiation monitoring of people and the environment beyond any statutory radiation monitoring duties.
8. During the recovery phase of a nuclear (or other radiation emergency) the co-ordination of radiation monitoring of people and the environment will be undertaken by the Monitoring Subgroup of the Recovery Co-ordinating Group. The Monitoring Subgroup will be chaired initially by PHE CRCE, offering continuity between radiation monitoring co-ordination in the emergency phase and the early recovery phase.
9. Longer term chairing of the monitoring subgroup and the lead for the co-ordination of resources for radiation monitoring of people and the environment in the recovery phase will depend on the nature of the incident and the recovery monitoring priorities. This will be decided by the members of the monitoring subgroup and agreed with the Recovery Co-ordinating Group, chaired by the Local Authority.
10. Each organisation will retain responsibility for the management and health and safety of its own staff and for recording monitoring results in RIMNET.

Collation of monitoring results

11. RIMNET will be used to collect, collate and display monitoring results to be presented to the RCG for discussion. The monitoring results presented are likely to provide greater clarity to the RCG on the current situation. This may require an update of the strategic aims, resulting in the need to amend the monitoring strategy. This will be an iterative process.

Radiation monitoring challenges and constraints

12. The monitoring resource and laboratory capability to support the monitoring strategy are likely to be limited. Also, there may be a need to plan for radiation monitoring over many weeks or months, working within the requirements of health and safety legislation and the working time directive. These factors, along with the fact that contamination monitoring and sample collection require a methodical approach, means that radiation monitoring and the presentation of monitoring results can be a slow process. In some cases it may take several days between the collection of samples and the presentation of results. Expectations will need to be managed.

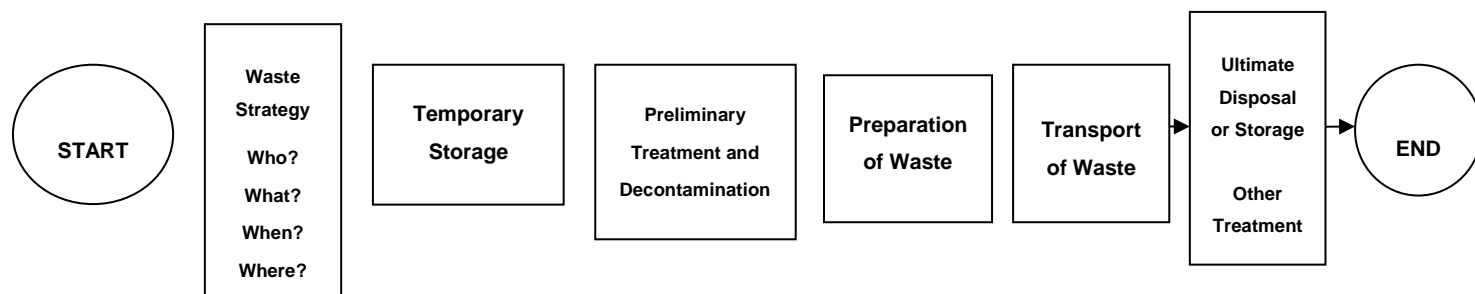
13. For widespread contamination, it may be impractical to monitor everywhere and care will need to be taken in designing measurement and sampling regimes. Contamination levels are also subject to significant influence by external factors such as the weather and the movement of vehicles and people, therefore radiation monitoring can only provide an indication of contamination levels in an area at a particular point in time.

Annex W: Radiological protection principles following a nuclear emergency

1. There are two key categories of exposure relevant to radiological emergency response and recovery:
 - Exposures that are sufficiently high to lead directly to tissue damage, resulting in direct serious injury to individuals such as skin reddening, damage to bone marrow and gastrointestinal tract
 - Exposures below those capable of causing direct serious injury but which may lead to a small increased risk of health problems, such as cancer incidence, in the future.
2. PHE recommends three Principles of Radiological Protection for response to radiological emergencies. These take into account recommendations from the International Commission on Radiological Protection (ICRP) and interpret them for application in the UK. These Principles are:
 - All protection and intervention measures should aim to do more good than harm (*Justification*);
 - Protection and intervention measures should aim to avoid the occurrence of serious direct injury (*avoid serious direct injury*); and
 - Protection and intervention strategies for exposures below the thresholds for serious direct injury should aim to maximise the benefit achieved (*Optimisation*).
3. These principles mean that radiation dose is not the only determinant of action. Also, where decontamination or other measures, such as access controls, are applied to a contaminated area, the reduction of dose achieved must be weighed against the other forms of detriment to those affected. For example, restriction of access or damage to properties, general disruption of everyday life and the potentially significant psychological and physical health effects that may result from these.

Annex X: Waste management following a nuclear emergency

1. Dealing with all radioactive waste should be considered in the early stages of the emergency and with preplanning, where possible, this will help eliminate or reduce later problems and pressures. The various stages and considerations for the waste management cycle are shown below.



2. Interventions to restrict radiation exposures during recovery may lead to a generation of wastes contaminated with radioactivity. For example, food such as fruit, vegetables and crops, water used for decontamination of surfaces, as well as soil and vegetation removed from affected areas. Contaminated waste may also be produced at sewage works if waste water is treated there. The following sections apply to the disposal and accumulation of solid and liquid wastes of all descriptions – whether soil, foodstuffs, non-food plants and animal carcasses, man-made contaminated substances and items from the built environment.

The role of the waste regulators

3. Government appointed regulators, Environment Agency (EA), Scottish Environment Protection Agency (SEPA), Natural Resources Wales (NRW) and Northern Ireland Environment Agency (NIEA) have statutory powers to:
 - authorise accumulation and disposal of radioactive waste as defined under the regulations¹⁰;
 - issue consents for the discharge of non-radioactive components of liquid effluences to controlled waters under the Water Resources Act 1991 (WRA91); and
 - license the disposal of controlled waste on land under Part II of the Environmental Protection Act 1990 (EPA90).
4. The Agencies have an overarching duty under the Environment Protection Act (1990) to protect and enhance the environment. They also have specific duties under the European Commission Habitats Directive to protect certain key habitats and species.

Management of radioactive waste

5. In the event of an environmental incident involving radioactive substances, including a nuclear emergency, the Agencies are responsible for regulating

¹⁰ Environmental Permitting Regulations 2010 (EPR10) in England and Wales and Radioactive Substances Act 1993 (RSA93) in Scotland

the safe accumulation and safe disposal of radioactive wastes arising. In some circumstances where statutory authorisation is not applicable, the Agencies would provide regulatory advice within the UK's emergency response arrangements.

6. The provisions of EPR10 and RSA93 which apply to radioactive substances were not drafted to provide for nuclear incidents. It is recognised that 'normal regulation' of radioactive waste under the regulatory provisions may not be possible in the event of such an incident. Annex Y sets out the Environment Agency's regulatory position for the management of radioactive waste following a nuclear emergency. In Scotland, at the time of an incident, SEPA will bring together expertise to advise on the management of waste (radioactive and other) depending on the nature of the waste and contaminant. This is in keeping with the way that SEPA deal with other aspects of emergency response. Tables 1 and 2 provide a summary of roles and responsibilities for UK radioactive waste management in England, Wales and Scotland.

Food wastes

7. If contaminated food were not radioactive waste within the meaning of EPR10 and RSA93, it would then, with the exception of waste from private gardens, be agricultural waste. As such, contaminated food would be a controlled waste and subject to statutory regulation under Part II of the Environment Protection Act 1990.

Liquid wastes

8. If contaminated liquid wastes - including milk - were to be disposed of directly to controlled waters, this would need to be subject to a discharge consent issued as an environmental permit under the Environmental Permitting Regulations 2010. In the case of disposal to sewer, there may be a defence available to the sewerage undertaker against prosecution if the undertaker received an effluent to its sewerage system which it was not bound to receive.
9. For non-radioactive aspects of liquid disposals to controlled waters, the Agencies have powers under WRA91 to prevent further environmental damage from discharges of other matter. These could include neither sewage, nor trade effluent alone. They may use their powers to promote a preferred disposal option. The Agencies may also serve enforcement notices for discharges of sewage or trade effluent regulated by discharge consent.

International Obligations: OSPAR

10. The OSPAR Convention, which the UK has ratified, is concerned with the protection of an area of the marine environment which includes the sea surrounding the UK. DEFRA has confirmed that the requirements of the Convention relating to dumping do not necessarily apply in the case of force majeure, subject to the provision that such dumping is conducted in such a way as to minimise the likely impact and the OSPAR Commission is notified immediately. Therefore, UK contingency plans should be designed to

sensibly minimise any likely impact on the marine environment, and provision included to notify OSPAR immediately after the event.

Decontamination and clean-up

11. The UK Government Decontamination Service (GDS) is concerned with the recovery of the open and built environment following a chemical, biological, radiological, nuclear (CBRN) or major Hazardous Material (HazMat) incident. Its primary function is to provide advice, guidance and assistance on decontamination related issues to responsible authorities in the planning for, and recovery from the spread of radioactive material following an offsite nuclear release. GDS will also provide expert scientific and technical advice to relevant groups, including the Science and Technical Advice Cell (STAC) and Recovery Co-ordination Group (RCG) supported by a framework of specialist suppliers. For example, on:
 - Remediation options;
 - Remediation techniques and technologies;
 - Sampling and monitoring plans;
 - Containment and treatment of the contamination; and
 - Waste disposal.
12. GDS is on call 24/7 to facilitate characterisation, decontamination services, waste management and disposal through the specialist private-sector suppliers available through the GDS Supplier Framework. Only experienced and suitably qualified radiation professionals from the Framework will carry out operational activities. They will be legally supervised by an appointed Radiation Protection Advisor and Radiation Waste Advisor, and adhere to radiation safety practices for the protection of themselves, the general public and the environment.
13. The capabilities of GDS Framework suppliers include:
 - Pre-decontamination characterisation to establish and confirm the nature and extent of radioactive contamination and post-decontamination sampling and analysis to confirm the effectiveness of the clean-up.
 - Decontamination to make the scene suitable for handover to the Contracting Authority. Suppliers will deliver their capability in accordance with the agreed decontamination plan and the contract with the Contracting Authority.
 - Collection, treatment, packaging and transport of wastes to interim storage and/or final disposal in accordance with regulations and where appropriate, guidance from regulators.
 - Facilitation of arrangements for the minimisation, containment, characterisation, collection, recording, temporary storage, transport and safe permanent disposal wastes where possible. Disposal will be in accordance with national guidelines according to the type of waste.

14. In the event of a major CBRN incident or hazardous material (HazMat) event in England, the table below shows the roles and responsibilities associated with waste stakeholders likely to become involved dependent on the location, circumstances and nature of the incident or event.

Table 1 Roles and responsibilities for waste management in England and Wales

	Organisation	Roles and responsibilities
Government	Department for Environment, Food and Rural Affairs	Waste policy lead; Lead Government Department for Recovery of open environment / environmental issues including the Government Decontamination Service
	Department. for Communities and Local Government	Recovery of built environment: Valuations: Audit Commission: Planning Inspectorate: Mass public decontamination.
	Department of Energy and Climate Change	Radioactive waste policy lead: Energy supply policy
	Attorney General's Office	Crown prosecution service: Treasury Solicitors Office:
	Cabinet Office	Civil Contingencies Secretariat – Response and Recovery oversight: Public sector procurement
	Department for Business, Innovation and Skills	Land Registry: UK trade and investment: Ordnance Survey: Weather: Go Science
	Department for Culture, Media and Sport	National Heritage, cultural artefacts and media communications
	Department for Education	Advisory teaching role for children on hazards, threats and risks following incident / event
	Department for Transport	Transportation routes licences and vehicle / driver certification
	Department of Health	NHS England health care related issues: Epidemiological studies on hazardous waste facilities
	Foreign and Commonwealth Office	International Diplomacy Issues
	HM Treasury	Central Government Funding
	Home Office	Police, Law and Order
	Ministry of Defence	Military Aid – Equipment PPE -Assets and specialist PPE trained personnel
	Ministry of Justice	Coroner's Courts – Judicial System
	Department for Work and Pensions	Policy Home for HSE
	Food Standards Agency	Food Safety Policy Lead
	Environment Agency, NRW, NIEA	Government appointed regulator with powers to authorise accumulation and disposal of radioactive

Agencies and public bodies		waste as defined under the regulations ¹¹ , issue consents for the discharge of non-radioactive components of liquid effluences to controlled waters under the Water Resources Act 1991 (WRA91) license the disposal of controlled waste on land under Part II of the Environmental Protection Act 1990 (EPA90)
	Natural England	Responsible for Special Areas of Conservation, Special Protection Area, and Ramsar (wetland) sites in England and also Sites of Special Scientific Interest in England.
	Health and Safety Executive	Worker and industrial safety regulator.
	Office for Nuclear Regulation	Nuclear Industry Regulator includes transportation of radioactive material, including radioactive waste
	Nuclear Decommissioning Authority	Responsible for managing the decommissioning of the UK's nuclear legacy and implementing government policy on radioactive waste disposal.
	Met Office	Provision of weather information and Chemical Meteorology (Chemet) pollution mapping
	Public Health England	Provision of expertise on contaminants' and pollution and the threat and risks posed to communities: High Volume Air sampling and other monitoring and sampling.
	Drinking Water Inspectorate	Ensuring the safety of drinking water.
	Animal and Plant Health Agency (APHA)	Animal welfare monitoring and sampling also disposal issues
	Centre for Environment, Fisheries and Aquaculture Science	Marine environment welfare regulator also monitoring, sampling provision.
	The Food and Environment Research Agency	Sampling and monitoring capability provision
	Marine Management Organisation	Pollution and contamination disposal of waste materials at sea
	Maritime and Coastguard Agency	Port and sea waste transportation issues
	Vehicle Certification Agency	The VCA is the UK authority for the certification of packaging and intermediate bulk containers used for the transport of dangerous goods, in accordance with national and international regulations.
	Defence Science and Technology Laboratory	Expertise in sampling and monitoring capability provision
Defence Science and Technology Laboratory	Expertise in sampling and monitoring capability provision	

¹¹ Environmental Permitting Regulations 2010 (EPR10) in England and Wales and Radioactive Substances Act 1993 (RSA93) in Scotland

	Food Standards Agency	Safety and hygiene of food and animal feed, including preventing unfit food entering the food chain, advice on the disposal of waste where it may lead to contamination of food and animal feed
	Radioactive Incident Monitoring Network	Pollution mapping and background monitoring and sampling for radiological contaminants
	Atomic Weapons Establishment	Sampling and monitoring capability provision
Local Authorities	County councils and Unitary Authorities	Non statutory role in providing information and input to waste strategy and policy formulation.
	Waste Planning Authorities (County Councils and Unitary Authorities)	Should provide appropriate guidance on the location and siting of new waste facilities together with granting and enforcement of planning permissions for new facilities.
	Waste Collection Authorities (Districts/Boroughs & Unitary Authorities)	Must arrange for the collection of waste from households and, if requested from commercial premises. Must dispose of waste as directed by WDA (under two tier arrangements)
	Waste Disposal Authorities (WDAs) (County Councils and Unitary Authorities)	Must arrange for the treatment / disposal of controlled County (County Councils and Unitary Authorities) waste collected by the WCAs (for two tier arrangements) Special Waste (hazardous waste) may require specialist intervention. Preparation of municipal waste management strategy, a statutory responsibility for two-tier authorities to produce these jointly.
	Greater London Authority	To plan for and oversee strategy to deal with waste including hazardous waste for 33 London local authorities including the City of London.
	UK and EU Joint Research Centre (JRC) –Scientific collaboration group	A collaborative group of government, academia and business laboratories providing support on a wide and diverse area of environmental management and emergency related activities.
	Commercial Water Companies	In England the main responsibility for ensuring drinking water is clean and “wholesome” and not contaminated or polluted by waste lies with the water companies that supply it
	Local Authority	Where a local authority considers that the public water supply may become unwholesome or insufficient, it must inform the water supplier, which must then take appropriate action.
	Local Authority	Planning issues and use of contaminated land.
Chartered Institution of Wastes Management	The Chartered Institution of Wastes Management is the professional body which represents waste and resource professionals.	

Commercial Waste Contractors	The waste market is a competitive landscape with 45% of the market shared by the top five waste companies. Most of these larger operators have an international footprint, and offer services across a wide range of waste management segments.
County councils and Unitary Authorities	Non statutory role in providing information and input to waste strategy and policy formulation.
Waste Planning Authorities (County Councils and Unitary Authorities)	Should provide appropriate guidance on the location and siting of new waste facilities together with granting and enforcement of planning permissions for new facilities.
Waste Collection Authorities (Districts/Boroughs & Unitary Authorities)	Must arrange for the collection of waste from households and, if requested from commercial premises. Must dispose of waste as directed by WDA (under two tier arrangements)
Waste Disposal Authorities (WDAs) (County Councils and Unitary Authorities)	Must arrange for the treatment / disposal of controlled County (County Councils and Unitary Authorities) waste collected by the WCAs (for two tier arrangements) Special Waste (hazardous waste) may require specialist intervention. Preparation of municipal waste management strategy, a statutory responsibility for two-tier authorities to produce these jointly.

15. In the event of a major incident which requires the management of waste in Scotland, the table below shows the roles and responsibilities associated with waste stakeholders likely to become involved dependent on the location, circumstances and nature of the incident or event.

Table 2 Roles and responsibilities for waste management in Scotland

	Organisation	Roles and Responsibilities
Government	Scottish Government - Radioactive Waste Policy	Radioactive waste policy lead: lead SG department for recovery following radiation incident
	Scottish Government - Animal Health and Welfare Division	Animal welfare monitoring and sampling. Also disposal issues.
	Scottish Government - Education	Advisory role for children on hazards, threats and risks following incident / event
	Procurator Fiscal Office	Consider legal charge following incident / event
	Crown Office	Consider legal case submitted by Procurator Fiscal.
	Lord Advocate in Scotland	Provide legal advice to Scottish Government
	Advocate General for Scotland	Provide legal advice to UK Government
Agencies and NDP bodies	Animal and Plant Health Agency (APHA)	An agency of Defra that acts on behalf of Scottish Ministers in Scotland. Provides advice and support on animal health and welfare monitoring, carcase disposal and similar activities.
	Scottish Environment Protection Agency (SEPA)	Radioactive waste and waste regulator; environmental law enforcement waste issues exemption orders. Responsible for the enforcement of the Control of Major Accident Hazard (COMAH) regulations in Scotland.
	Scottish Natural Heritage (SNH)	Responsible for special areas of conservation, special protection areas and Ramsar (wetland) sites in Scotland and also sites of scientific interest in Scotland.
	Health and Safety Executive (HSE)	Worker and industrial safety regulator for staff involved in clean up following incident / event.
	Office for Nuclear Regulation (ONR)	Nuclear Industry Regulator for safety and security of nuclear sites. Also has regulatory responsibility for the transportation of radioactive waste
	Nuclear Decommissioning Authority (NDA)	Responsible for managing the decommissioning of the UK's nuclear legacy and implementing government policy on radioactive waste disposal.
	Met Office	Provision of weather information, chemical meteorology (Chemet) pollution mapping and background monitoring and sampling for radiological contaminants using the Radiation Incident Monitoring Network (RIMNET).
	Public Health England, Centre for Radiation, Chemical and Environmental Hazards (PHE CRCE)	Provision of expertise on contaminants and pollution and the threat and risks posed to communities. High volume air sampling together with other monitoring

	Organisation	Roles and Responsibilities
		and sampling.
	Scottish Water	Responsible for ensuring public drinking water is clean and “wholesome” and not contaminated or polluted by waste.
	Drinking Water Quality Regulator (DWQR)	Ensuring the safety of public drinking water supplies. Includes private water supplies.
	Marine Scotland	Pollution and contamination disposal of waste materials at sea
	Marine and Coastguard Agency (MCA)	Port and sea waste transportation issues.
	Food Standards Scotland	Safety and hygiene of food and animal feed, including preventing unfit food entering the food chain, advice on the disposal of waste where it may lead to contamination of food and animal feed.
Local authorities	All 32 Local Authorities in Scotland	Should provide appropriate guidance on the location and siting of new waste facilities together with the granting and enforcement of planning permissions for new facilities
		Must arrange for the collection of wastes from households and, if requested from commercial premises
		Must arrange for the treatment / disposal of controlled waste collected. Special Waste (hazardous) may require specialist intervention. Preparation of household waste management strategy
		Planning issues and use of contaminated land
		Responsibility for monitoring of private water supplies following incident / event.

Annex Y: Environment Agency Regulatory position statement (765_13): The management of radioactive wastes following a major incident

Background

1. Under normal circumstances, the accumulation and disposal of radioactive waste requires a permit from the Environment Agency, issued under the Environmental Permitting Regulations 2010 (EPR10). The provisions of Schedule 23 to EPR10, which apply to radioactive substances activities, were not drafted to provide for nuclear incidents and other major radiological incidents that have off-site implications, and we recognise that 'normal regulation' of radioactive waste under the provisions of EPR10 may not be possible in the event of such an incident.
2. We do not want the process of issuing permits to delay or distract us from our priority objective to facilitate clean up through ensuring appropriate management of the radioactive wastes arising from the clean-up. We can ensure the necessary controls are applied through direct engagement with the Recovery Co-ordinating Group (RCG - a multi-agency group established under national contingency plans to oversee the clean-up and decontamination operations) and through prior notification of waste management proposals.
3. In the event of an extensive and protracted clean-up, it may be necessary to seek amendment to EPR10 to exempt or exclude certain categories of radioactive waste, or government may choose to require us to do the same by means of a direction from the relevant Secretary of State. However, neither of these legal instruments is likely to be in place within the first weeks following an incident, hence the need for a regulatory position statement to deal with the early phase of any clean-up.
4. As the situation stabilises and it becomes practicable to do so, we will revert to requiring permits for the accumulation and disposal of radioactive wastes.

Our approach

5. In the event of a major incident involving radioactive contamination, we will not require the holder of any radioactive waste resulting from the incident to obtain an environmental permit for the accumulation and disposal of those radioactive wastes where:
 - the holder of the wastes, or the RCG on the holder's behalf, obtains our prior approval of the proposals for the management of the wastes, and, where specified in that approval, makes any required modifications to the proposals; and
 - the proposals conform, so far as is reasonably practicable, to the principles and, where relevant, the standards set out in Appendix 1 (of that document)
6. This approach will be withdrawn as the situation stabilises - we will give stakeholders adequate notice of our intention to do this.

Enforcement

7. In not pursuing an application for a permit, we will not normally take enforcement action unless the activity has caused, or is likely to cause, pollution or harm to health. For a more detailed explanation of this enforcement position, please see our *Enforcement and Sanctions statement*. This can be found on the 'How we regulate you' page in the *Business & Industry section* of our web site.
8. This regulatory position will be reviewed by 28 October 2016.

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Annex Z: Practical guidelines for managing wastes contaminated with radioactivity

1. Much is likely to depend on the circumstances of a particular emergency. In some instances it might be better to leave the contamination in place and control site access. Whatever is decided, the disposal and accumulation of solid and liquid radioactive wastes of all descriptions will be the subject to advice from the environment agencies.
2. The overall guiding principle is that a framework for dealing with all waste arising should be defined at the outset. This means that:
 - As with other aspects of the Recovery Co-ordinating Group's considerations, feasible options are identified and evaluated, and the best practicable environmental option is selected;
 - The consequences of available options - whether technical or involving social consequences such as public opinion - are foreseen; and
 - Action is not taken in haste – so as to avoid unnecessary problems later.
3. The need to avoid hasty action which may subsequently be regretted may favour a decision to remove radioactive wastes for interim storage, rather than prompt disposal - especially where the wastes:
 - are of relatively small volume;
 - are not readily dispersible, or can be made not readily dispersible by simple means such as in situ fixing/sealing of contamination, or containment in drums or ISO freight containers; or
 - require further characterisation prior to disposal.

Waste segregation

4. In terms of optimising radioactive waste management, consideration should be given to whether segregation of more-contaminated waste from probably greater volumes of less-contaminated waste would be worthwhile.

Environmental impact assessment

5. Before selecting a disposal option for radioactive wastes, an environmental impact assessment should always be undertaken and considered, both in terms of the radiological impact and any other environmental detriment which may result. A balance may need to be struck between the urgency of disposal and the level of detail which can be included in the assessment. In the case of putrescible or chemically-toxic wastes, the non-radiological environmental impact may be the dominant consideration.

Disposal options

6. Advice on disposal options should always be sought from the relevant environment agency in the circumstances of a particular emergency. However, the selection of disposal options for solid radioactive wastes, should consider the approach for dealing with radioactive wastes from routine operations, as follows
 - Wastes containing no alpha emitters, and not more than 400 kBq total activity in any 0.1m³ of the waste, and not more than 40kBq in any one

item of the waste, may be authorised by the environment agencies for disposal with ordinary refuse to a landfill site;

- Wastes containing not more than 4 GBq/t of alpha emitters, and not more than 12 GBq/t of other radionuclides - that is, within the UK definition of 'Low Level Waste' - may be authorised by the Agency for disposal either by controlled burial at a permitted landfill site, or to the Low Level Waste Repository near Drigg.; and
 - Wastes which exceed these limits for Low Level Waste (i.e. intermediate level waste) should generally be removed for storage at a nuclear licensed site.
7. On logistical grounds it may be preferable to dispose of wastes to a permitted landfill site, particularly if the wastes are of large volume.
 8. In terms of radiological impact, the predominance of radionuclides of relatively short half-lives would also tend to favour local landfill disposal. There should be a presumption that any long-term storage of intermediate level waste would be undertaken at a nuclear licensed site.
 9. Long term storage of low level wastes may be undertaken elsewhere and public perception may be a key factor to include in the decision.

Annex A1: Guidance from the Food Standards Agency on the current position on the disposal of food contaminated with radioactivity

Introduction

1. A major radiation emergency could result in agricultural land becoming contaminated to the extent that some food could exceed European Council Food Intervention Levels. There would be a legal requirement to prevent such food from being placed on the market, and there could be a need for disposal. The choice of disposal option will depend on a number of factors, for example, the volumes and types of food, the time over which the problem is likely to persist and the nature of the contamination. The problem is scenario specific and this means that it is not possible to plan in advance which disposal options will be used in the event of a radiation emergency. However, a large amount of work has been carried out to assess these options and this note summarises the work.
2. The FSA would work in conjunction with the appropriate environment authority (EA, NRW, NIEA or SEPA) and other agencies to identify the most appropriate disposal options. The FSA has a responsibility to ensure that the public are protected from contaminated food and, therefore, has a responsibility to know that contaminated food has been disposed of safely and there is no risk of it entering the food chain. Food Standards Scotland is responsible for food safety in Scotland and will collaborate with the FSA as appropriate under their agreed Memorandum of Understanding. FSA and FSS are not responsible for the disposal of contaminated food.

The potential problem

3. In the event of a radiation emergency, milk is likely to be a large-scale disposal issue, especially if short-lived radionuclides such as iodine-131 are released. These isotopes readily transfer to cow's milk, reaching peak levels in 3 days, leading to an immediate problem for milk disposal. To put this into perspective, it has been predicted that a severe, beyond reasonably foreseeable radiation emergency could lead to several million litres of milk requiring disposal in the first few weeks after a food restriction order is placed.
4. For emergencies where longer lived isotopes are released, milk and crops could require disposal. Again, the quantities involved will be dependent upon the foodstuffs produced in the area, the radionuclides involved, the soil type, the time of year etc.

Current situation

5. There have been several reviews of agricultural countermeasures, and the latest UK research can be found in the UK Recovery Handbook for Radiation Incident, Public Health England, 2015.
6. It is appreciated that stakeholder involvement is essential in determining the appropriate waste disposal options for contaminated foodstuffs following a radiation emergency. The choice of options will not be based purely on scientific assessment. It is essential that other factors, such as the social

acceptability and economic implications of the method be taken into consideration.

7. In 1997, the then Ministry of Agriculture, Forestry and Fisheries (MAFF) and National Radiological Protection Board (NRPB) jointly set up the Agricultural and Food Counter Measures Working Group (AFCWG). Membership comprised senior representatives from the food retail, farming and water industries, academia, consumer groups and government agricultural departments. AFCWG was actively involved in assessing acceptability of the agricultural and domestic production and free food countermeasures and disposal options in the Recovery Handbook. The AFCWG has now gone into abeyance but a similar group could be established and consulted on the options presented in the recovery strategy in the event of a nuclear emergency.
8. The AFCWG set up a number of subgroups to particularly investigate waste disposal issues associated with milk following a nuclear emergency. The outcome of these investigations and discussions has been compiled within the AFCWG Guidance Document "Dealing with Milk Following a Nuclear Emergency", which is available through former AFCWG members. This guidance document was used to develop the options for disposal of contaminated milk which can be found in the UK Recovery Handbook for Radiation Incidents, Public Health England, 2015.

Annex B2: Typical timeline for the development and delivery of a nuclear recovery exercise

When	What
Eight months before	<p>Assemble exercise planning team</p> <p>Agree purpose of exercise and who it is for</p> <p>Agree what you want to test – including co-ordination of recovery and development/delivery of recovery strategy</p> <p>Agree the spatial and temporal scope of the exercise. For example, 20 km radius on days 3-5 after release.</p> <p>Agree objectives, outcomes and measures of success</p> <p>Asses and agree exercise format - desk top, workshop, modular or full exercise.</p> <p>Establish requirements for recovery exercise venue and facilities, identify options, assess and book.</p> <p>Identify refresher training requirements – book venue/facilities</p> <p>Start development of Recovery Exercise Operational Order</p> <p>Develop Communications Plan for exercise</p>
Six months before	<p>Identify the off-site consequences that the nuclear emergency scenario will need to deliver to satisfy the exercise objectives.</p> <p>Establish the initiating sequence of events and the release of radioactivity to deliver the off-site consequences.</p> <p>Implement relevant elements of the Communications Plan – including briefing for participating organisations.</p>
Three to five months before	<p>Identify the data and information that players will need to make decisions in the context of the exercise. Adjust according to what data and information will realistically be available.</p> <p>Generate offsite radioactive contamination picture and assess short, medium, long term doses in the geographical areas to be considered.</p> <p>Present contamination and dose information in readily understandable formats reflecting what would reasonably be available in exercise time.</p> <p>Agree how players will be briefed on events and actions (closed/on-going) leading up to the start of exercise play.</p> <p>Agree how exercise players will be tasked</p> <p>Develop the back story leading up to the start of exercise. See Annex T.</p> <p>Update exercise Operational Order</p> <p>Implement relevant elements of the Communications Plan</p>
One-two months before	<p>Develop driving scripts, injects and player materials</p> <p>Develop facilitator materials</p> <p>Collate list of players</p> <p>Develop debriefing process</p> <p>Update Exercise Operational order</p> <p>Implement relevant elements of the Communications Plan</p>
One to two weeks before	<p>Finalise operational order</p> <p>Validate driving script</p> <p>Deliver training tailored to need Brief exercise facilitators</p> <p>Deliver training</p> <p>Confirm venue and facilities requirements</p> <p>Issue players brief</p> <p>Implement relevant elements of the Communications Plan</p>
A few days before	<p>Assemble all materials for recovery exercise</p> <p>Undertake walk through: talk through of</p> <p>Implement relevant elements of the Communications Plan</p>
Nuclear recovery exercise	<p>Implement operational order</p>

Annex C3: Guidance to support the testing of emergency plans

1. Further information to support the testing of emergency plans can be found at:

- The exercise planners guide, Home Office 1998
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/61087/the-exercise-planners-guide.pdf
- Emergency Preparedness (Chapter 5), November 2005.
https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/61028/Emergency_Preparedness_chapter5_amends_21112011.pdf
- Lessons identified from UK exercises and operations: a policy framework. Cabinet Office, January 2011.
<https://www.gov.uk/government/publications/lessons-identified-from-uk-exercises-and-operations-a-policy-framework>
- Preparing Scotland: Scottish exercise guidance

Preparing Scotland: Scottish Guidance on Preparing for Emergencies: Recovering from Emergencies in Scotland

<http://www.gov.scot/Resource/Doc/284553/0086426.pdf>

Annex D4: Nuclear recovery exercise objectives and suggested formats

Recovery issue to be exercised	Detail of what to exercise	Reason for exercising issue	Scenario time line	Who and what you need to exercise the recovery issue	Suggested exercise format
1 How we manage recovery and work together: Co-ordinating nuclear recovery					
1.1 Management of the Recovery Co-ordination Group (RCG)	<ul style="list-style-type: none"> • Role of RCG Chair • Terms of Reference. Do the ToR adequately describe the role of RCG? • Meeting management. Do we have the right representation, agenda and focus? Is the decision-making effective? Does the battle-rhythm allow organisations to input and feedback from all meetings? (For example STAC, RCG in response phase and recovery subgroups later). • Strategic leadership and development of recovery strategy. 	<p>To check that guidance on Management of RCG set out in UK Nuclear Recovery Plan Template and implemented in LA Off-site plans is effective. (For example role of chair, Terms of Reference, meeting guidelines and agenda, representation).</p> <p>To test timing and organisation of recovery meetings (RCG and subgroups).</p> <p>To highlight gaps and identify improvements.</p> <p>To give players an opportunity to rehearse their recovery roles.</p>	Recovery phase	<p>Who: Organisations normally represented at RCG.</p> <p>What: A plan which sets out the role of the RCG Chair, Terms of Reference for group, sample meeting agenda and outline battle-rhythm. Recovery strategy template Recovery plan template</p>	<p>Level 2/ 3 exercise</p> <p>Recovery exercise linked to Level 2/3 exercise</p>
1.2 Interfaces between STAC and RCG and the role of the RCG Liaison Officer	<ul style="list-style-type: none"> • Role of RCG Liaison Officer • Timing of STAC, RCG and RCG Meetings • Flow of information between STAC and RCG. • Tracking of STAC advice to ensure implications for longer term recovery are identified and understood. • Provision of early recovery advice to RCG. 	<p>To develop the role and terms of reference for RCG Liaison Officer.</p> <p>To ensure we have an effective mechanism to review impact of early protective measures and options for long term recovery.</p>	Response phase	<p>Who: STAC and RCG convened in line with UK Nuclear Recovery Plan</p> <p>What: Template or LA Off-site Plan. RCG Liaison Officer playing.</p>	Level 2/ 3 exercise
1.3 Interface between local and national recovery	<ul style="list-style-type: none"> • Communication between and situational awareness at local and national levels reporting • Effectiveness of strategic, tactical, operational decision making at local national level • Development of local recovery strategy and delivery plan underpinned by national policy support. 	To test and improve the interfaces between local and national management of recovery	Late response phase to early recovery phase	<p>Who: LDG – DECC, DEFRA, Scottish Government, Welsh Government, as well as DCLG, RCG, SAGE, STAC, recovery subgroups</p> <p>What: LGD recovery plan Local recovery plan</p>	Separate recovery exercise/ workshop
1.4 Stakeholder	<ul style="list-style-type: none"> • Role of Community Recovery Committee 	To check that guidance on CRC in UK	Late	Who:	Recovery

Recovery issue to be exercised	Detail of what to exercise	Reason for exercising issue	Scenario time line	Who and what you need to exercise the recovery issue	Suggested exercise format
engagement	<p>(CRC) as a vehicle for involving stakeholders in decision-making.</p> <ul style="list-style-type: none"> • Setting up of CRC. • Managing interface between CRC and RCG. • Community recovery plan • Relevant supporting plans developed by the Local Resilience Forum (LRF) • Stakeholder involvement in recovery subgroups. 	<p>Nuclear Recovery Plan Template (and implemented in LA Off-site Plan) achieves its aims. For example involving the views of stakeholders in decisions to get a community back to a new normality. To test the effectiveness of the community recovery plan and other supporting plans developed by the LRF</p> <p>To test whether CRC can be set up quickly and effectively when required. To make sure communications between RCG and CRC are effective so views can be taken into account. To test how CRC will be kept informed of decisions.</p>	<p>response phase into recovery phase</p>	<p>Stakeholders to involve in different types of decision.</p> <p>What: Off-site Plan which includes formation of CRC. Mechanism/procedures for setting up CRC. Understanding of the types of decisions in which you would want to involve stakeholders. CRC membership list/contact details Agreement of CRC members to participate in exercise</p>	<p>exercise linked to Level 2/3 exercise</p> <p>Separate recovery exercise/ workshop</p>
1.5 Handover chairing of SCG from Police to the Local Authority and provision of advice from ONR on status of nuclear facility	<p>Formal handover based on the use of handover criteria. Effectiveness of SCG decision-making on hand over.</p>	<p>To make sure timing of handover is about right – neither too early nor too late To rehearse provision of advice from ONR to SCG to facilitate decision on hand over. (On-site incident is over and will not recur). To ensure that current criteria and handover certificates are fit for purpose and that all relevant factors are taken into account.</p>	<p>End of response phase beginning of recovery phase</p>	<p>Who: ONR SCG</p> <p>What: Handover criteria Handover certificate</p>	<p>Level 2/ 3 exercise</p> <p>Recovery exercise linked to Level 2/3 exercise</p>
1.6 Effectiveness of communication and co-operation between recovery subgroups	<p>Methods of communication. (For example use of Liaison Officer, briefing notes, circulating minutes of meetings). Satisfactory handling of cross-cutting issues. For example getting agreement on recommendations for clean-up will involve input from subgroups dealing with finance, health and welfare, environment, waste management. Specific Liaison Officer roles for subgroups. Maintaining an audit trail of questions, responses and decisions made.</p>	<p>To make sure communication and co-operation between recovery subgroups is effective. Conflicts and issues between subgroups are resolved before RCG meeting Record-keeping, formal communications, to prevent things getting lost</p>	<p>Recovery</p>	<p>Who: Full recovery structure in place – RCG & subgroups</p> <p>What: Terms of Reference for recovery subgroups</p>	<p>Recovery exercise linked to Level 2/3 exercise</p> <p>Separate recovery exercise/ workshop</p>
1.7 Subgroup structures and procedures	<p>Chairmanship of subgroups Terms of reference</p>	<p>Focussed, effective operation of subgroups</p>	<p>Recovery</p>	<p>Who: Recovery subgroup structure in</p>	<p>Recovery exercise linked</p>

Recovery issue to be exercised	Detail of what to exercise	Reason for exercising issue	Scenario time line	Who and what you need to exercise the recovery issue	Suggested exercise format
	Method of working – organisation of workload – for example, splitting subgroup further Maintaining focus on relevant issues Liaison with other subgroups Record keeping Concise reporting back to RCG	To enable RCG to make effective decisions.		place What: UK Recovery Plan Template	to Level 2/3 exercise Separate recovery exercise/ workshop
1.8 Inter-agency working	How the environment agencies ¹² , PHE-CRCE and FSA/FSS work together to deliver feasible options for remediation. Agreement between different tiers of local govt as to who will lead on recovery. How agencies will work together to deal with decontamination and waste disposal. Provision of advice on drinking water – environment agencies/DWI/LA	To identify areas where inter-agency co-operation is essential.	Response and recovery phase	Who: Environment agencies, PHE-CRCE, FSA,FSS What: Recovery action plan	
1.9 Development of an effective public communications strategy	Press conferences Press releases Co-ordinated communications strategy Public meetings	To gain public confidence in the recovery strategy.	Response into recovery	Who: Stakeholders (or actors) What: Media briefing centre Simulated public meeting	
1.10 Financial arrangements	Provision of information to key audiences on how make compensation claims Effectiveness of answering public queries about compensation Clean-up costs Nuclear Installations Act liability NDA compensation scheme	Who pays for what? To check that 'one stop shop' arrangements for compensation claims work effectively	Response into recovery	Who: DECC/NDA/LA/SGLO/MOD What: NDA compensation scheme NIA liability	Recovery exercise linked to Level 2/3 exercise Separate recovery exercise/ workshop

¹² Environment Agency in England, Scottish Environment Protection Agency and Natural Resources Wales.

Recovery issue to be exercised	Detail of what to exercise	Reason for exercising issue	Scenario time line	Who and what you need to exercise the recovery issue	Suggested exercise format
2 Addressing recovery issues: Developing and delivering a nuclear recovery strategy					
<p>2.1 Co-ordinating remediation activities and restricting access</p> <p>We need to consider how this issue can be broken down into manageable chunks</p>	<p>Understanding the extent and levels of contamination. Develop a monitoring strategy (see above) Understanding of factors influencing decision-making for remediation, for example balancing scientific justification for decisions vs public perception. Identifying what has been affected – land use, population distribution, economic activity, vulnerable groups, political sensitivities. Identifying feasible options for 'recovery' Agree the end point for action Presentation of recommendations to RCG Management of implementation...how it will work on the ground. Managing the resources and people needed to do the work. Management of worker doses</p>	<p>It's the crux of recovery.</p>		<p>Who: Organisations normally represented in SCG and RCG</p> <p>What: Recovery handbook Condo Geographical Information Systems Information on demographics of local area Vulnerable groups Information prepared in advance on land use, businesses, vulnerabilities in the recovery planning zone</p>	<p>Separate recovery exercise/workshop</p>
<p>2.2 Development and implementation of a waste management strategy</p>	<p>Ability of the waste subgroup to develop strategic aims for waste management</p> <ul style="list-style-type: none"> waste segregation, minimisation decay storage media handling strategy <p>Identify success criteria Identifying wastes Options for collection and temporary storage Options for disposal Availability of resources/getting co-ordinating resources Who is going to pay Compensation for loss or damage to property/possessions Delivery of advice and recommendations to Strategic Recovery Co-ordination Group How Waste Subgroup will manage implementation of strategy.</p>	<p>If we don't manage wastes contaminated with radioactivity properly, there are risks to public health and safety, national security and potential damage to reputation.</p> <p>To identify and recognise gaps in national/local waste management arrangements</p>	<p>Recovery phase</p>	<p>Who: LA, environment agencies, PHE CRCE, GDS, Contractors, HO, DfT, DoH, NHS Board (Scotland), MOD</p> <p>What: Recovery Handbook Condo Technical assessors with capability of using Recovery Handbook and Condo Personnel with legislative understanding</p>	<p>Recovery exercise linked to Level 2/3 exercise</p> <p>Separate recovery exercise/workshop</p>

Recovery issue to be exercised	Detail of what to exercise	Reason for exercising issue	Scenario time line	Who and what you need to exercise the recovery issue	Suggested exercise format
	Evaluate success of waste strategy and implementation.				
2.3 Development and implementation of environmental monitoring strategy	<p>Identify availability of resources</p> <p>Identify monitoring priorities</p> <p>Agreement on when to stop monitoring</p> <p>Develop and refine monitoring strategy</p> <p>Identify success criteria</p> <p>Present strategy to strategic group</p> <p>Effectiveness of comms between organisations involved in monitoring</p> <p>Risk assessment and H&S for monitoring teams</p> <p>Co-ordination of technical assessments and bringing together of advice from partner organisations.</p> <p>How to manage contracts and contractors</p> <p>Doing monitoring and how it works</p> <p>Data collation, presentation and distribution</p> <p>Evaluate success of monitoring strategy and feedback improvements.</p>	<p>Public reassurance</p> <p>Identifying limitations of types of monitoring equipment</p> <p>Purpose of monitoring is to identify areas which need remediation – this is essential to the overall objective of returning communities to new normality</p> <p>Monitoring resource finite so we need to prioritise according to need</p> <p>Identify limits/constraints on monitoring capability.</p> <p>We need to check the long-term sustainability of monitoring resources (for example fatigue).</p>	Response and recovery phase	<p>Who:</p> <p>PHE, Operators, environment agencies, GDS, LA, Dstl, MOD, Met Office-RIMNET, DoH, NHS Board (Scotland), FSA, FSS Contractors</p> <p>Trained personnel</p> <p>Technical assessors with capability of using Recovery Handbook and Condo</p> <p>People who understand relevant legislation.</p> <p>What:</p> <p>Equipment</p> <p>Communications infrastructure</p> <p>RIMNET</p> <p>Recovery Handbook</p> <p>Condo</p> <p>Information prepared in advance on land use, businesses, vulnerabilities in the recovery planning zone</p>	<p>Recovery exercise linked to Level 2/3 exercise</p> <p>Separate recovery exercise/ workshop</p>
2.4 Dealing with milk contaminated with radioactivity	<p>Estimate the volume of contaminated milk – over various time scales</p> <p>Measure levels of contamination</p> <p>Identify and assess options for dealing with contaminated milk</p> <p>Make recommendations and present to Strategic Recovery Co-ordinating Group</p> <p>Management of implementation of milk disposal</p> <p>Co-ordination of technical assessments and bringing together of advice from partner organisations.</p> <p>Identify limitations of proposed options for disposal.</p> <p>How will contaminated milk be stored prior to</p>	We need a well planned strategy for dealing with large volumes of milk being produced and the difficulties of storage. Milk will go on being produced.	Response and recovery phase	<p>Who:</p> <p>FSA, FSS, DEFRA, PHE, environment agencies, Animal and Plant Health Agency (APHA), LA, GDS.</p> <p>NHS Boards (Inc. Public Health).</p> <p>Farmers' Union, Consumer Groups, Food Industry reps</p> <p>Technical assessors with capability of using Recovery Handbook and Condo</p> <p>What:</p> <p>Recovery Handbook</p> <p>Condo</p>	Recovery exercise linked to Level 2 or 3 exercise

Recovery issue to be exercised	Detail of what to exercise	Reason for exercising issue	Scenario time line	Who and what you need to exercise the recovery issue	Suggested exercise format
	<p>disposal Consider need for permissions and public perception. When do you no longer need to dispose of milk? Options for monitoring / screening of milk to verify compliance prior to release for sale. Test the usefulness of the milk guidance in the UK Recovery Handbook for Radiation Incidents, Public Health England, 2015.</p>			<p>Information prepared in advance on land use, distribution of dairy farms, head of cattle.</p>	
<p>2.5 Dealing with crops (e.g. arable) which have been contaminated with radioactivity</p>	<p>Estimate the volume of contaminated crops and area affected. Identify the types of crops affected. Measure levels of contamination Identify and assess options for dealing with contaminated crops Co-ordination of technical assessments and bringing together of advice from partner organisations. Identify limitations of proposed options for disposal How will contaminated crops be stored, where? Make recommendations and present to Strategic Recovery Co-ordinating Group Management of implementation of disposal of crops. Consider need for permissions and public perception When can land be used to grow crops again? Can alternative crops be grown (e.g. non-food crops or less susceptible crops)? Co-ordination of technical assessments and bringing together of advice from partner organisations.</p>	<p>We need a well planned strategy for dealing with crops that have been contaminated with radioactivity. We need the assurance that the arrangements work. The risks of not having one</p> <ul style="list-style-type: none"> • food not under sufficient control may get into food chain • damage to reputation of multi-agency group • contamination is not removed 	<p>Response and recovery</p>	<p>Who: FSA, FSS, environment agencies Consumer Groups, Farmers' Union Industry Representatives Technical assessors with capability of using Recovery Handbook and Condo People who understand the relevant legislation. What: Recovery Handbook Condo 3 Technical assessors with capability of using Recovery Handbook and Condo</p>	<p>Recovery exercise linked to Level 2 or 3 exercise</p>

Annex E5: Template for developing the sequence of events leading up to the start of a nuclear recovery exercise

Suggested topics for storyboard	Storyboard content to set the scene for the exercise					'Live' exercise play	
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6 Recovery exercise	Day 7 Recovery Exercise
Weather							
Events on the nuclear facility							
Status of off-site countermeasures							
Incident Management <ul style="list-style-type: none"> summary of local response SCG/RCG decisions summary national response COBR/decisions 							
Headline communications							
Public reaction							
Political reaction							
International reaction							
Emerging issues for exploration in the live exercise. For example impact on schools, impact on local agriculture, upcoming major golf tournament, anti-nuclear protests							
DETAIL							
Monitoring and sampling <ul style="list-style-type: none"> Resources Co-ordination Results 							
Impacts on health and welfare							
Impacts on environment <ul style="list-style-type: none"> Food, water, infrastructure 							

Suggested topics for storyboard	Storyboard content to set the scene for the exercise					'Live' exercise play	
	Day 1	Day 2	Day 3	Day 4	Day 5	Day 6 Recovery exercise	Day 7 Recovery Exercise
Impacts on infrastructure • Transport and utilities							
Impact on business and economy • Industry, services, tourism, leisure and heritage							
Actions of key organisations e.g. Nuclear operator, emergency, services, local authority, PHE, FSA/FSS, environment agencies, others							

Annex F6: Glossary, Abbreviations and Acronyms

1. A further glossary of emergency planning terminology is available at: <https://www.gov.uk/government/publications/emergency-responder-interoperability-lexicon>

Abbreviation or acronym	Definition
ACP	Access Control Point. Controlled point through which essential non-emergency service personnel may gain access through the outer cordon.
ACPO	Association of Chief Police Officers. The professional body of chief police officers. Its core activity is developing policing policy.
ACPOS	Association of Chief Police Officers (Scotland) The professional body of chief police officers in Scotland. Its core activity is developing policing policy.
Activity	<p>Attribute of an amount of a radionuclide. Describes the rate at which transformations occur in it. Unit Becquerel. Symbol Bq. 1 Bq = 1 transformation per second.</p> <p>There is also a need to include the prefixes associated with SI units i.e.</p> <p>μ = micro = 1/1,000,000 m = milli = 1/1,000 k = kilo = 1000 M = mega = 1,000,000 G = giga = 1,000,000,000</p>
AFCWG	Agricultural and Food Countermeasures Working Group. A group, established in 1997, to involve stakeholders in the development of strategies for managing agricultural land and products following a nuclear accident.
ALARP	As low as reasonably possible.
AWE	Atomic Weapons Establishment.
Beyond design basis	A very low frequency, high consequence radiation emergency that is not reasonably foreseeable (as defined in REPPiR para 206).
BSSD	Basic Safety Standards Directive.
Category 1 responder	A person or body listed in Part 1 of Schedule 1 to the Civil Contingencies Act. These bodies are likely to be at the core of the response to most emergencies. As such, they are subject to

	the full range of civil protection duties in the Act.
Category 2 responder	A person or body listed in Part 3 of Schedule 1 to the Civil Contingencies Act. These are co-operating responders who are less likely to be involved in the heart of multi-agency planning work, but will be heavily involved in preparing for incidents affecting their sectors. The Act requires them to co-operate and share information with other Category 1 and 2 responders.
CBRN	A term used to describe Chemical, Biological, Radiological or Nuclear materials.
CCA	Civil Contingencies Act of 2004 which established a single framework for Civil Protection in the United Kingdom. Part 1 of the Act establishes a clear set of roles and responsibilities for Local Responders; Part 2 of the Act establishes emergency powers
CCG	Clinical Commissioning Groups.
CCR	Contact and Control Room – Police.
CCS	Cabinet Office Civil Contingencies Secretariat. Cabinet Office secretariat which provides the central focus for the cross-departmental and cross-agency commitment, co-ordination and cooperation that will enable the United Kingdom to deal effectively with disruptive challenges.
CESC	Central Emergency Support Centre – EDF and Magnox.
CFIL	Council Food Intervention Levels. Criteria laid down by the European Union for intervention in food safety.
CNC	Civil Nuclear Constabulary. National specialised armed police service whose role is the protection of civil nuclear sites and nuclear materials.
COBR	Cabinet Office Briefing Rooms. UK Government’s dedicated crisis management facilities, which are activated in the event of an emergency requiring support and co-ordination at the national strategic level.
COMAH	Control of Major Accident Hazards Regulations 1999, 2015 Northern Ireland 2000. Regulations applying to the chemical industry and to some storage sites where threshold quantities of dangerous substances, as identified in the Regulations, are kept or used.
CONOPS	Concept of Operations 1. The statement of UK Central Government arrangements for

	<p>responding to an Emergency.</p> <p>2. A high level description of how a defined system will operate to achieve defined strategic objectives. CONOPS will establish the higher-level framework within which more specific, operational-level plans, protocols and procedures will be developed and implemented.</p>
CRC	Community Recovery Committee.
CRIP	Common Recognised Information Picture. A single, authoritative strategic overview of an emergency or crisis that is developed according to a standard template and is intended for briefing and decision-support purposes.
CSA	Chief Scientific Advisor.
DCLG RED	Department for Communities and Local Government, Resilience and Emergencies Division (DCLG-RED) act as a conduit for communications between central government and the local level. They are responsible for supporting local response and recovery efforts, and ensuring that there is an accurate picture of the situation in their area.
DECC	Department for Energy and Climate Change. The Lead Government Department in the event of an emergency at a civil nuclear site in England or Wales. It is also the Lead Government Department for co-ordinating the response to an overseas nuclear emergency.
Defra	Department for Environment, Food and Rural Affairs. The Lead Government Department responsible for policy and regulations on the environment, food and rural affairs. Is also responsible for minimising the impact of emergencies on food production, fishing and farming.
DEPZ	Detailed Emergency Planning Zone. Area surrounding a nuclear licensed site for which detailed plans for emergencies have been prepared. The area covered by the DEPZ is agreed with the nuclear regulator and is based on the reference accident for that site. HSE guidance on REPIR 209a states that “a defined zone surrounding each installation (the detailed emergency planning zone) within which arrangements to protect the public are planned in detail.”
DNEO	Defence Nuclear Emergency Organisation. Provides the Ministry of Defence response to an emergency, including one arising through terrorist acts, involving defence nuclear assets.
DNSR	Defence Nuclear Safety Regulator. The MOD independent regulator for nuclear and radiological safety and environmental

	protection in the defence nuclear programme.
DPH	Director of Public Health senior Public Health official who provides strategic leadership for health protection, improvement and joint working with social services.
DSTL	Defence Science and Technology Laboratory. An Agency of the Ministry of Defence (MOD) that exists to supply impartial Scientific and technical research and advice to the MOD and other government departments.
DWI	Drinking Water Inspectorate.
EA	Environment Agency. The Environment Agency's role is to protect and enhance the environment as a whole in England and Wales. As part of this role, they are also a nuclear regulator in respect of controlling discharges to the environment. An executive non-departmental public body responsible to the Secretary of State for DEFRA.
ECC	Emergency Control Centre. Generic term for a centre for controlling and co-ordinating the response of an organisation to an incident or an emergency.
ECC(W)	Emergency Control Centre (Wales). Welsh Government centre co-ordinating a multi-agency response to an emergency and acting as a link between the local level and the Cabinet Office Briefing Rooms.
EEPZ	Extended Emergency Planning Zone.
EHO	Environmental Health Officer.
Emergency exposures	A justified and formally authorised dis-application of dose limits under IRR99 for the purpose of allowing emergency response by pre-identified people to a radiation emergency under REPIR for the purpose of life-saving or plant intervention tasks. See Intervention Personnel.
EOC	Emergency Operations Centre (DECC – previously NEBR) A DECC facility to brief the government following declaration of an Off-site Nuclear Emergency.
EPC	Emergency Planning College. Leading provider of training for emergency preparedness and crisis management, run for and on behalf of the Cabinet Office by Serco.
EPCC	Emergency Planning Consultative Committee. Local emergency planning forum between nuclear site operators and key

	stakeholders for the off-site emergency plan.
EPR10	Environmental Permitting Regulations 2010.
ERL	Emergency Reference Levels. Quantitative criteria used to plan for the introduction of urgent countermeasures in the event of a nuclear emergency.
Extendibility	A characteristic of plans that may be developed for specific circumstances but are able to be applied, or 'scaled up' to larger, or otherwise different circumstances.
FCP	Forward Command Post. Any service's command and control facility nearest the scene of the incident, responsible for immediate direction, deployment and security. This might be an Operational / Bronze or Tactical / Silver facility depending on the circumstances of the incident.
FOB	Forward Operating Base.
FRSNCC	Fire & Rescue Service National Coordination Centre.
FSA	Food Standards Agency. A non-ministerial Government department which acts to protect the public's health and consumer interests in relation to food. If necessary, can issue food restriction orders under the Food and Environment Protection Act 1985 (FEPA).
FSS	Food Standards Scotland.
GDS	Government Decontamination Service. DEFRA agency responsible for providing advice and guidance to responsible authorities on CBRN or HAZMAT related decontamination issues.
GLO	Government Liaison Officer. The lead member of the Government Liaison Team - in a non-terrorist emergency, an official from the Department of Communities and Local Government Resilience and Emergencies Division; in a terrorist emergency a Home Office official.
GLT	Government Liaison Team. Central government, multidisciplinary team, led by the Government Liaison Officer, dispatched to the site of an emergency to facilitate communication and co-operation between the government and local responders.
GOLD	The strategic level of command and control (above Silver level and Bronze level) at which policy, strategy and the overall response framework are established and managed for individual

	responder agencies.
Gray (Gy)	Unit of dose - most applicable when exposure is likely to lead to deterministic effects (i.e. emergency exposures).
GRLO	Government Recovery Liaison Officer.
GS-R-2	IAEA Safety Standards series: Preparedness and Response for a Nuclear or Radiological Emergency.
GTA	Government Technical Advisor. A senior official, usually from HSE's Nuclear Directorate who attends the Strategic Co-ordination Centre to provide independent and authoritative advice to the police and other authorities handling the off-site response to a nuclear emergency.
Half-life	The time taken for the activity of a radionuclide to lose half of its value by decay.
HIRE	Hazard Identification and Risk Evaluation. (See REPPIR Reg. 4 which makes this a requirement).
HO	The Home Office is the lead government department for immigration and passports, drugs policy, counter-terrorism and policing.
HSE	The Health and Safety Executive and the Health and Safety Commission (HSC) are responsible for the regulation of almost all the risks to health and safety arising from work activity in Great Britain.
HSWA	Health and Safety at Work Act. Primary piece of legislation covering occupational health and safety in the United Kingdom. The Health and Safety Executive is responsible for enforcing the Act and a number of other Acts and Statutory Instruments relevant to the working environment.
IAEA	International Atomic Energy Agency. The IAEA is the world's centre of cooperation in the nuclear field. It was set up as the world's "Atoms for Peace" organization in 1957 within the United Nations family. The Agency works with its Member States and multiple partners worldwide to promote safe, secure and peaceful nuclear technologies.
IEM	Integrated Emergency Management.
IMG	Impact Management Group. Sub-group in the Cabinet Office Briefing Rooms (COBR). Normally chaired by the Cabinet Office and comprising representatives of other departments and

	agencies involved in consequence management.
INES	International Nuclear & Radiological Event Scale. A tool for promptly communicating to the public in consistent terms the safety significance of reported nuclear and radiological incidents and accidents.
Intervention personnel	Are pre-identified people who respond to prevent or decrease the exposure of persons to radiation from a radiation emergency or from an event, which could lead to a radiation emergency.
IRR99	The Ionising Radiations Regulations 1999.
JEPU	Joint Emergency Planning Unit - Local Authorities.
JESIP	Joint Emergency Services Interoperability Programme.
JRLO	Joint Regional Liaison Officer.
LGD	Lead Government Department. Department of the United Kingdom government or devolved administration designated as responsible for overall management of the government response to an emergency or disaster. There are LGDs identified for both the response/acute and recovery phases of emergencies.
MACA	Military Aid to the Civil Authorities. Any category of assistance provided by the Ministry of Defence to the civil authorities.
MACC	Assistance provided by Ministry of Defence personnel under 3 categories: <ul style="list-style-type: none"> • -in an emergency • -for projects and events • -in social services (by volunteers)
Major incident	Any emergency that requires implementation of special arrangements by one or all of the emergency services, the NHS or local authorities to: rescue or treat large numbers of casualties, that directly or indirectly involves large numbers of people, that is likely to generate a large number of enquiries by the public or media or which requires the mobilisation of additional emergency services or supporting services.
MCC	Media Communications Cell (can also be referred to as Strategic Media Advice Cell - SMAC).
MEF	Media Emergency Forum. Ad hoc group of senior media editors, government representatives, local authority emergency planners, emergency services, police and the private sector set up to consider the provision of information to the public, and other media issues, in the context of civil emergencies.

MOD	Ministry of Defence.
MPL	Maximum Permitted Levels.
MRCC	Maritime Rescue Coordination Centre.
MRG	Ministerial Recovery Group.
mSv	millisieverts
NACC	National Ambulance Coordination Centre.
NCC	News Co-ordination Centre. A Cabinet Office unit working with the Lead Government Department to provide co-ordinating media and public communications support during an emergency.
NDA	Nuclear Decommissioning Authority
NEAF	Nuclear Emergency Arrangements Forum. A forum where the nuclear site operators meet to discuss planning, operations and regulatory issues on emergency arrangements with ONR attending as observers.
NEBR	DECC Nuclear Emergency Briefing Room (now EOC).
NEPLG	Nuclear Emergency Planning Liaison Group. A previous forum chaired by DECC This has been superseded by current governance arrangements.
NEPR PB	Nuclear Emergency Planning and Response - Programme Board.
NIA	Nuclear Installations Act.
NIEA	Northern Ireland Environment Agency.
NPoCC	National Police Coordination Centre.
NRA	National Risk Assessment. The full and classified assessment of the likelihood and potential impact of a range of different risks that might directly affect the UK.
NRCP	National Resilience Capability Programme.
NRR	National Risk Register. A publically available statement of the assessment of the likelihood and potential impact of a range of different risks that might directly affect the UK.
NRW	Natural Resources Wales.
ONR	Office for Nuclear Regulation seeks to secure the protection of people and society from the hazards of the nuclear industry, by

	<p>ensuring compliance with relevant legislation and by influencing the nuclear industry to create an excellent health, safety and security culture.</p> <p>It achieves this through:</p> <ul style="list-style-type: none"> • Working with other regulators and agencies • Issuing licenses for various aspect of nuclear energy and materials • Approving security arrangements within the industry and ensuring compliance with those arrangements • Overseeing the UK's international commitments on the peaceful use of nuclear energy • Engaging with all stakeholders in an open and transparent way to inspire confidence in their work.
ORG	Officials Recovery Group.
OSNE	Off Site Nuclear Emergency.
PACRAM	Procedures And Communications in the event of a release of Radioactive Material (Met Office).
PHE CRCE	Public Health England Centre for Radiation, Chemical and Environmental Hazards. A specialist centre of PHE which deals with radiation and chemical hazards and threats.
PIZ	Public Information Zone.
PWA	Principle Weather Advisor (Met Office).
PWR	Pressurised Water Reactor.
Radiation accident	An accident where immediate action would be needed to prevent or reduce exposure to ionising radiation.
Radiation emergency	An event which is likely to result in any member of the public being exposed to ionising radiation leading to an effective dose of more than 5mSv per year as defined in REPIR.
RCG	Recovery Coordinating Group - part of StratCC, takes over from SCG once response/acute phase ends.
RCIS	Redgrave Court Incident Suite (ONR).
Reasonable worst case	Designed to exclude theoretically possible scenarios which have so little probability of occurring that planning for them would be likely to lead to disproportionate use of resources (as defined in National Risk Assessment). This results in a challenging scenario after highly implausible scenarios are excluded (National Risk Register).

Reasonably foreseeable	An event which is less than likely but realistically possible (as defined in REPPIR para 50).
REPPIR	Radiation (Emergency Preparedness and Public Information) Regulations 2001. Framework of emergency preparedness measures to ensure that members of the public are properly prepared for a possible radiation emergency, and properly informed if one occurs.
REPPIR guidance	Non statutory guidance on REPPIR - 1 st Edition dated 2002.
ResCG	Response Coordinating Group.
RIMNET	The national radiation monitoring and nuclear emergency response system.
RMU	Radiation Monitoring Unit.
RSA93	Radioactive Substances Act 1993.
RVP	Rendezvous Point.
RWG	Recovery Working Group. Provides advice on recovery considerations arising from a nuclear emergency to the Strategic Co-ordinating Group during the response/acute phase.
SAGE	Scientific Advisory Group for Emergencies. Group of scientific and technical experts that is established to provide a common source of advice to inform decisions made during the central government response to an emergency.
SCC	Strategic Co-ordination Centre. The location at which the Strategic Co-ordinating Group meets.
SCG	Strategic Co-ordinating Group. Multi-agency body responsible for co-ordinating the joint response to an emergency at the local strategic level.
SEPA	Scottish Environment Protection Agency.
SGLO	Scottish Government Liaison Officer.
SGoRR	Scottish Government Resilience Room. A coordination facility of the Scottish Government that is activated in cases of national emergency or crisis, or during international events with major implications for Scotland.
SMAC	Strategic Media Advisory Cell. Multi-agency group set up within the Strategic Co-ordination Centre to ensure consistent

	communication is delivered by all agencies. Brings together media representatives of the key organisations involved in the response to the emergency and liaises with the main incident press office. Led by the Police Strategic Media Advisor during the response/acute phase, and the Local Authority Press Officer in the recovery phase.
Stable iodine	A stable form of iodine, which can bind to and protect the thyroid gland, preventing uptake of radioactive iodine by the gland and the increased likelihood of thyroid cancer in the future.
STAC	Science and Technical Advice Cell. Group of technical experts from those agencies involved in an emergency response that may provide scientific and technical advice to the Strategic Co-ordinating Group chair or single service gold commander.
TCC	Technical Co-ordination Centre. A response centre whose role is to provide technical and scientific advice to support the response to an overseas nuclear accident. Normally chaired by DECC but this role can be delegated if appropriate, depending on the issues to be discussed.
TCG	Tactical Co-ordinating Group. A multi-agency group of tactical commanders that meets to determine, co-ordinate and deliver the tactical response to an emergency.
TIIMS	The Incident Information Monitoring System.
WCCC	Wales Civil Contingencies Committee. Multi-agency group, including representatives from the Welsh Government, emergency services, local authorities, and others as applicable, convened as required to co-ordinate multiple strategic co-ordinating groups across Wales, in order to improve the co-ordination of the response to an emergency with a particular focus on consequence management and the recovery phase.
WRA91	Water Resources Act 1991.

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