



Contingency plans, recovery and
remediation – the legislative context

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Overview

- Emergency management phases
- Pre-incident legal requirements
- International nuclear and radiological event scale (INES)
- Response phase legal requirements
- Short and long term countermeasures
- Recovery and remediation phase legal requirements
- Return to normality



Emergency Management Phases

- Prevention/mitigation and preparedness
- Response phase
- Recovery and remediation phase
- Return to normality



Emergency Management Phases

- The late 6th century BC text “Art of War” by Sun Tzu says:

故曰 知己知彼 百戰不貽 不知
彼而知己 一勝一負 不知彼不
知 己 每戰必貽



Emergency Management Phases

- The “Art of War” by Sun Tzu says:

“If you know the enemy and know yourself, you need not fear the result of a hundred battles. If you know yourself but not the enemy, for every victory gained you will also suffer a defeat. If you know neither the enemy nor yourself, you will succumb in every battle.”



Pre-incident requirements (IRR99)

- IRR99 requires radiation employers to:
 - Undertake **prior risk assessments**
 - Identify all **hazards** with the potential to cause a radiation accident
 - **Evaluate the nature and magnitude of the risks** to employees and other persons arising from those hazards

Prevention &
Preparedness



Pre-incident requirements (IRR99)

- “*Radiation accident*” is defined in IRR99 as an accident where immediate action would be required to prevent or reduce the exposure to ionising radiation of employees or other persons.

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Preparedness**



Pre-incident requirements (IRR99)

- Where a radiation risk exists from an identifiable radiation accident then the radiation employer shall:
 - **Prevent** any such accident
 - **Limit** the consequences if it occurs
 - Provide employees with the **information, instruction and training**, and with the necessary training, to restrict their exposure to radiation.

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Preparedness**



Pre-incident requirements (IRR99)

- If a radiation accident is **reasonably foreseeable**, IRR99 requires radiation employers to prepare a **contingency plan** designed to “*secure, so far as is reasonably practicable, the restriction of exposure to ionising radiation and the health and safety of persons who may be affected by such accident*”.

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Pre-incident requirements (IRR99)

- Content of contingency plan should identify:
 - Which **postholders** are responsible for putting the plan into effect
 - What immediate actions for **assessing the seriousness** of the situation will be necessary
 - What immediate **mitigating actions** need to be taken
 - What **PPE/RPE** required and where it is

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Preparedness



Pre-incident requirements (IRR99)

- Content of contingency plan should identify:
 - Personal **dosimetry** requirements for those involved in controlling the accident
 - What **training** of personnel is required
 - How to obtain **radiation protection expertise**
 - When to summon the **emergency services**
 - What **follow up dosimetry** is needed

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Pre-incident requirements (IRR99)

- Radiation employer also required to:
 - Have the contingency plans identified in the **local rules** or incorporated in them
 - Persons who may be affected by arrangements to be given **suitable and sufficient instructions** and where appropriate issued with **suitable dosimeters**
 - **Perform rehearsals** of the arrangements in the plan at suitable intervals

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Pre-incident requirements (REPPIR)

- **Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR):**
 - Applies to work with ionising radiation which may have the capability of producing a **radiation accident**
 - Applies to **premises** and **transport operations**
- **Nuclear Installations Act 1965** (as amended) has similar provisions to REPPIR – compliance with the site license conditions should satisfy the equivalent provisions in REPPIR.

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Pre-incident requirements (REPPIR)

- “*Radiation accident*” is defined in REPPIR as an accident where immediate action would be required to prevent or reduce the exposure to ionising radiation of employees or other persons ***and includes a radiation emergency.***

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Pre-incident requirements (REPPIR)

- “*Radiation emergency*” is defined in REPPIR as any event (other than a pre-existing situation) which is likely to result in any member of the **public** being exposed **in the year after the incident** to ionising radiation in excess of:
 - 5 mSv effective dose
 - 15 mSv to the lens of the eye
 - 50 mSv over 1cm² area of skin

AND for this purpose any health protection measure to be taken during the 24 hours immediately following the event shall be disregarded.

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Preparedness**



Pre-incident requirements (REPPIR)

- REPPIR has similar requirements to IRR99:
 - to make an **assessment**;
 - **identify the hazards** with the potential to cause a radiation accident;
 - evaluate the **nature and magnitude of the risks** to employees and other persons;
 - **prevent** any such accident;
 - **limit the consequences** if the accident occurs.

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Pre-incident requirements (REPPIR)

- REPPIR requires **operators** to prepare an **emergency plan**
- Operator can not begin that work with ionising radiation unless both their emergency plan and the **off-site emergency** plan have been prepared.
- **Local authority** responsible for off-site plan and will **consult** on it's content.
- Review and **test the plan** at suitable intervals not exceeding 3 years (emergency services to be involved)

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Radiation Incident Occurs

Incident, Event or Accident

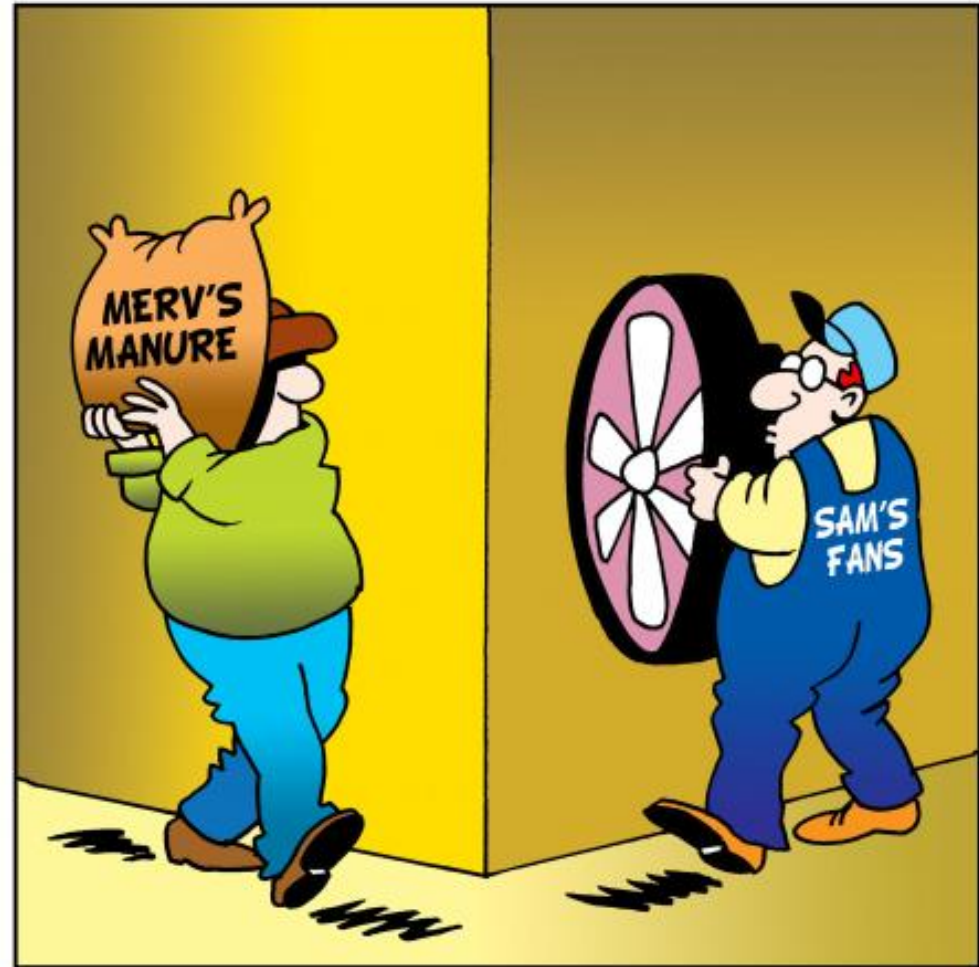


Prevention & Preparedness



Radiation Incident Occurs

Incident, Event or Accident



Prevention & Preparedness

Radiation Incident Types

Incident, Event or Accident

- Suspicious dose on a dosimeter
- Melting of an orphan source
- Loss of a HASS
- Spillage of radioactive material
- Overexposure of an employee
- Stolen industrial radiography source
- Damaged package during transport

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Radiation Incident Types

Incident, Event or Accident

- Airborne release of activity in a facility
- Failure of criticality control
- Loss of ventilation or power
- Elevated radiation levels in area
- Release of radioactivity to the environment due to filter failure

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Radiation Incident Types

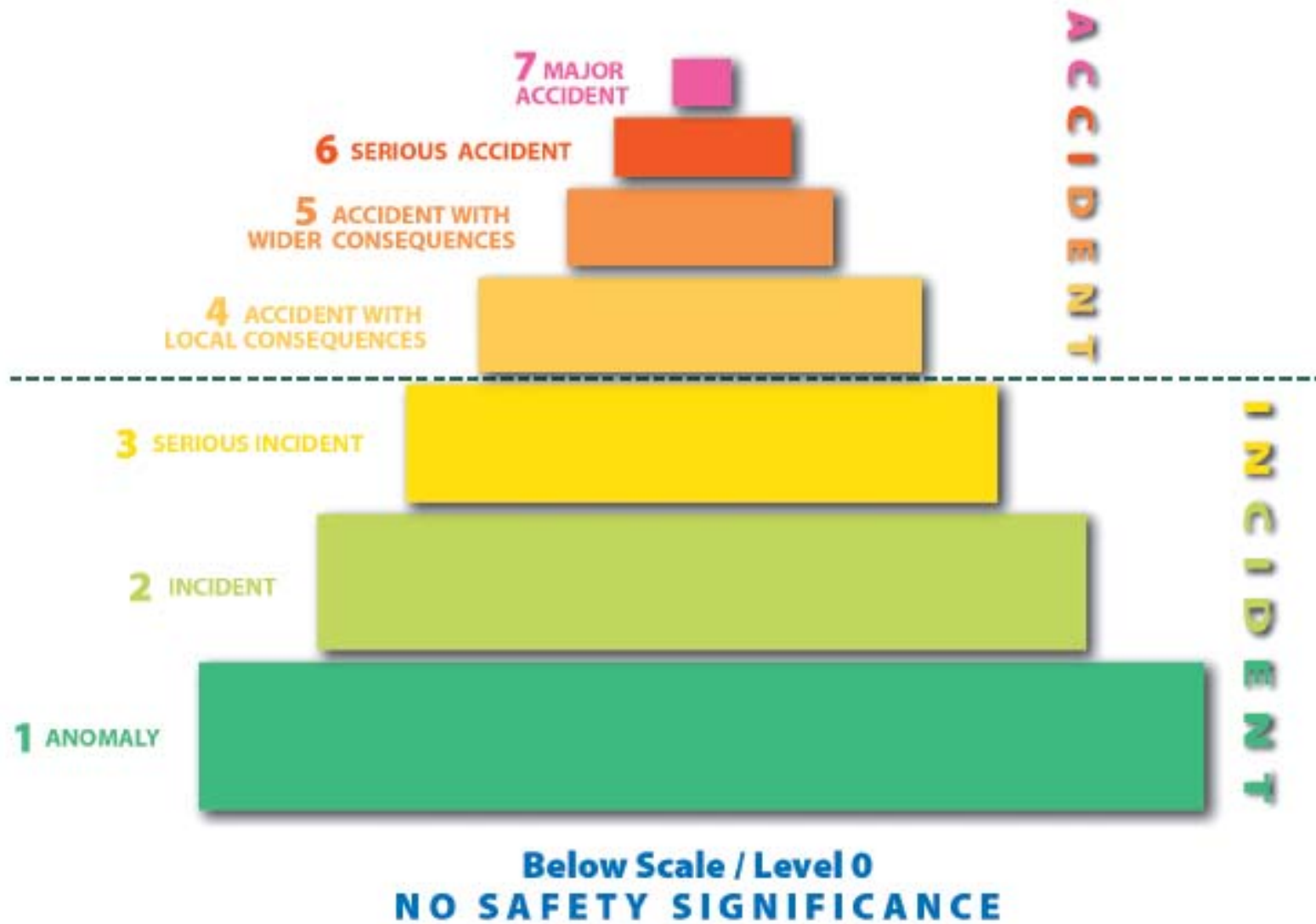
Incident, Event or Accident

- Fire in a facility resulting in a release to the environment
- Explosion in a facility
- Criticality incident
- Dirty bombs
- Improvised Nuclear Devices (IND)
- Reactor Core Melt
- Etc

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International Nuclear Event Scale



Response / Emergency phase

Incident, Event or Accident



**Prevention &
Preparedness**

**Response
Phase**



Response / Emergency phase aims

Incident, Event or Accident

- **Enact** the local **contingency plan**
- If required **enact** the **emergency plan** (on and off-site)

Prevention &
Preparedness

Response
Phase



Response / Emergency phase

Incident, Event or Accident

On site and **off-site** if appropriate:

- Introduction of **countermeasures** to deal with an immediate risk
- Interventions of **limited duration** and impact

Prevention &
Preparedness

Response
Phase



Response / Emergency phase

Incident, Event or Accident

IRR99 dose limits still apply in most cases.



**Prevention &
Preparedness**

**Response
Phase**



Response / Emergency phase

Incident, Event or Accident

Decisions about the need for **emergency exposures** of employees in **radiation emergency** situations and the **emergency dose levels** that should apply are an **integral part of emergency plan development.**

Prevention &
Preparedness

Response
Phase



Response / Emergency phase

REPIIR requires employers to:

- **Identify those employees** who may be subject to emergency exposures;
- Provide **information, instruction, training** so that they know the **health risks** created by the emergency exposure and the precautions needed;
- **Provide equipment** to restrict exposure;

Prevention &
Preparedness

Response
Phase



Response / Emergency phase

- **Medical surveillance** to be carried out after an emergency exposure;
- Make arrangements with an **ADS for a dose assessment** to be carried out without delay;
- Identify those **employees who shall be authorised**, in the event of a radiation emergency, **to permit an employee to be subject to an emergency exposure**;



Prevention &
Preparedness

Response
Phase



Response / Emergency phase

- No employee or trainee under 18 and no pregnant / breast feeding females are permitted to have an emergency exposure;
- Dose levels notified to the HSE for use in an emergency exposure situations should be appropriate and justified



Response / Emergency phase

- Provisional HSE Internal Guidance on **Dose Levels for Emergencies** states that **ALARP** needs to apply to intervention and not treat disapplication of IRR99 dose limits as a general amnesty on the need to control doses up to the notified dose levels for emergencies.



Response / Emergency phase

- Emergency dose levels which may be acceptable to the HSE for a given situation:
 - **Effective dose = 100 milliSv**
 - **Equivalent dose to the skin = 1000 milliSv**
 - Equivalent Dose to **Eye Lens = 300 milliSv**



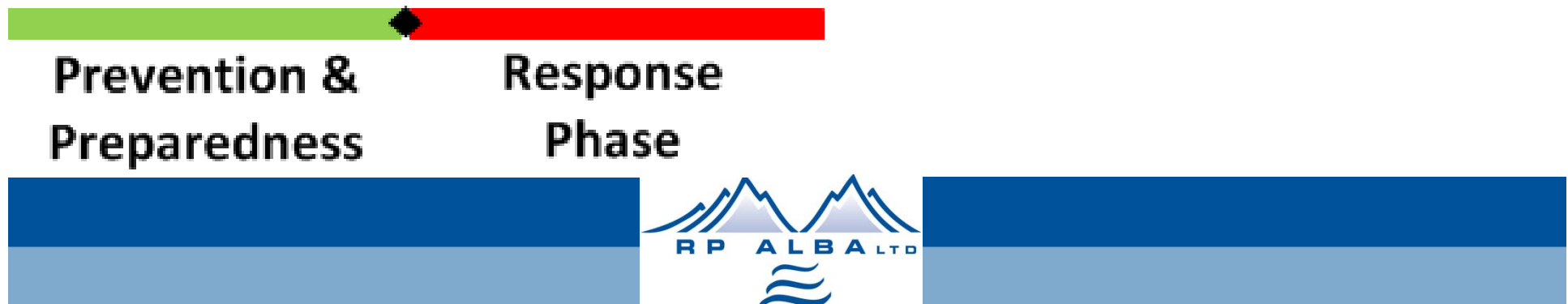
Prevention &
Preparedness

Response
Phase



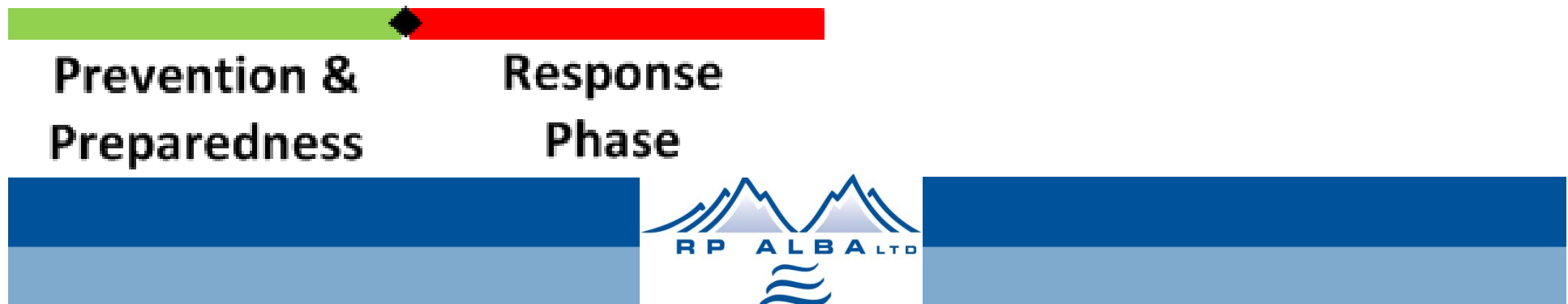
Response / Emergency phase

- Specific provision may be made explicitly for life saving, however it is desirable for planning purposes that the following levels should apply:
 - **Whole Body Dose = 500 milliGy**
 - **Dose to skin = 5000 milliGy.**



Response / Emergency phase

- Actions which carry a significant risk of these benchmarks being substantially exceeded should only be taken when the **likely benefits in terms of life saving clearly outweigh the risks to those carrying out the intervention.**



Recovery phase

Incident, Event or Accident

Transition



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Preparedness

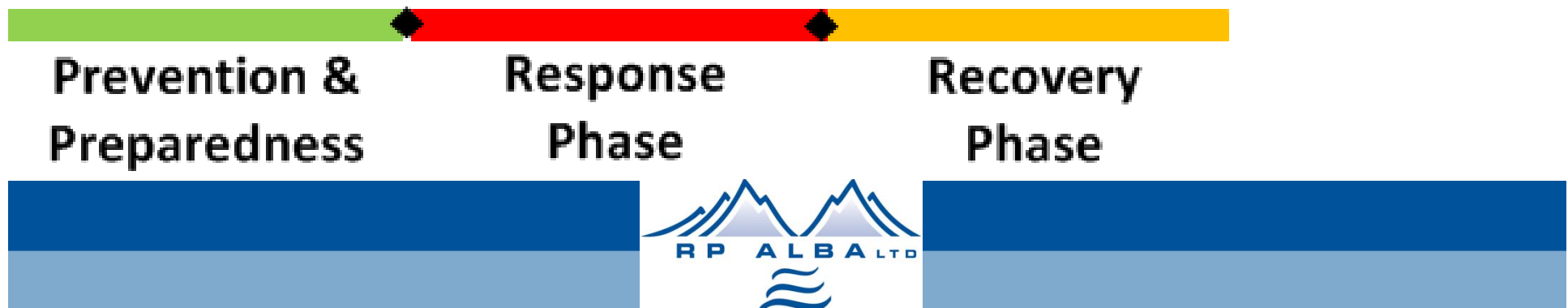
Response
Phase

Recovery
Phase



Recovery phase aims

- **Return to normality** i.e. “interventions should assist the population in returning to a way of living in which the accident is no longer dominant in their thinking”



Recovery phase

- Should be started as soon as possible
- Actions taken in the response phase can affect the recovery phase
- **Early recovery phase advice can improve the response phase actions**



Recovery phase

- Return to 'normality' as important as the need to avert chronic exposure
- Potential long term disruption and cost
- Strategy for ending recovery countermeasures
- Decisions required to balance the needs of minimising disruption and maximising dose reduction

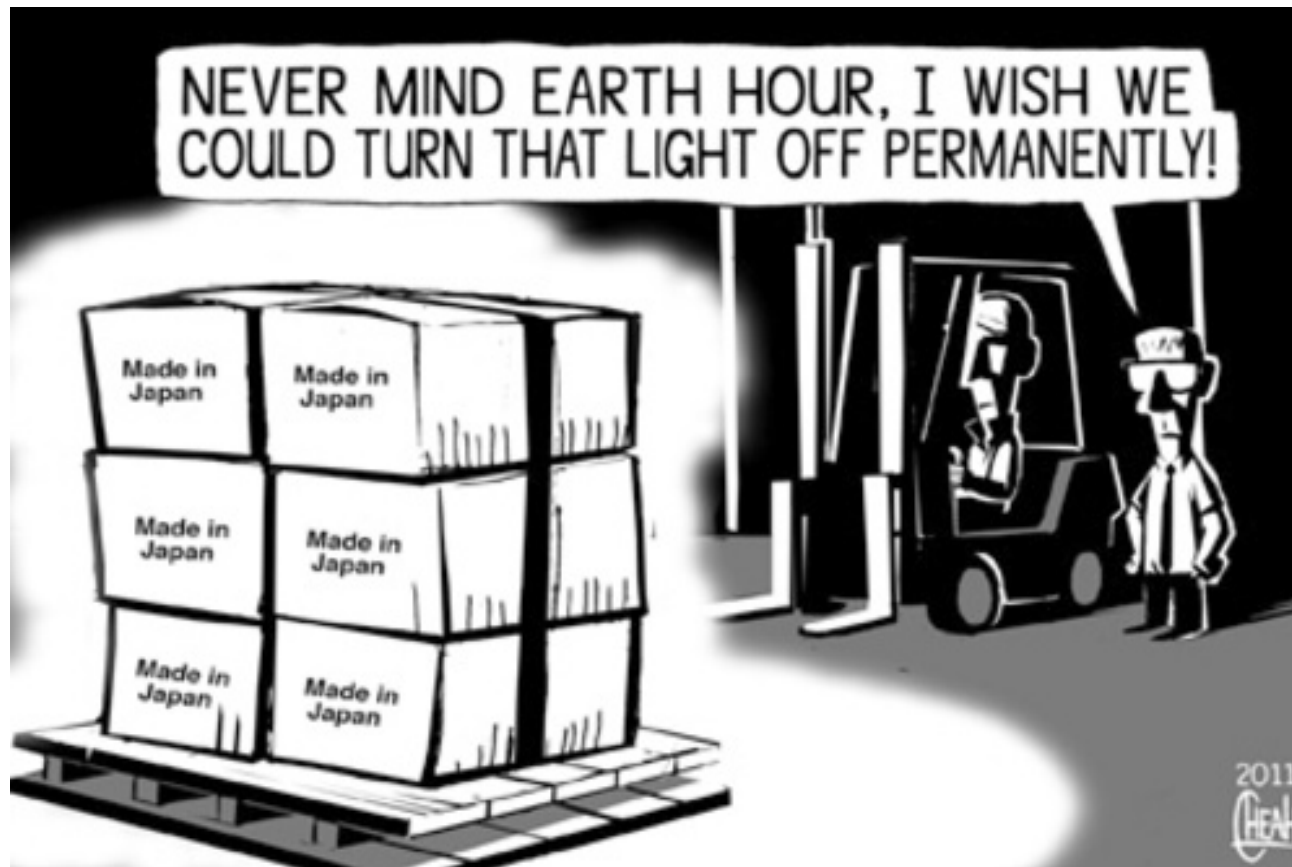


Recovery phase

- **Recovery phase** is an “**existing exposure situation**”
- **IRR99 and other normal legislation** applies during implementation
- Including **28 days prior notification** to HSE for new work with ionising radiations.



Recovery phase



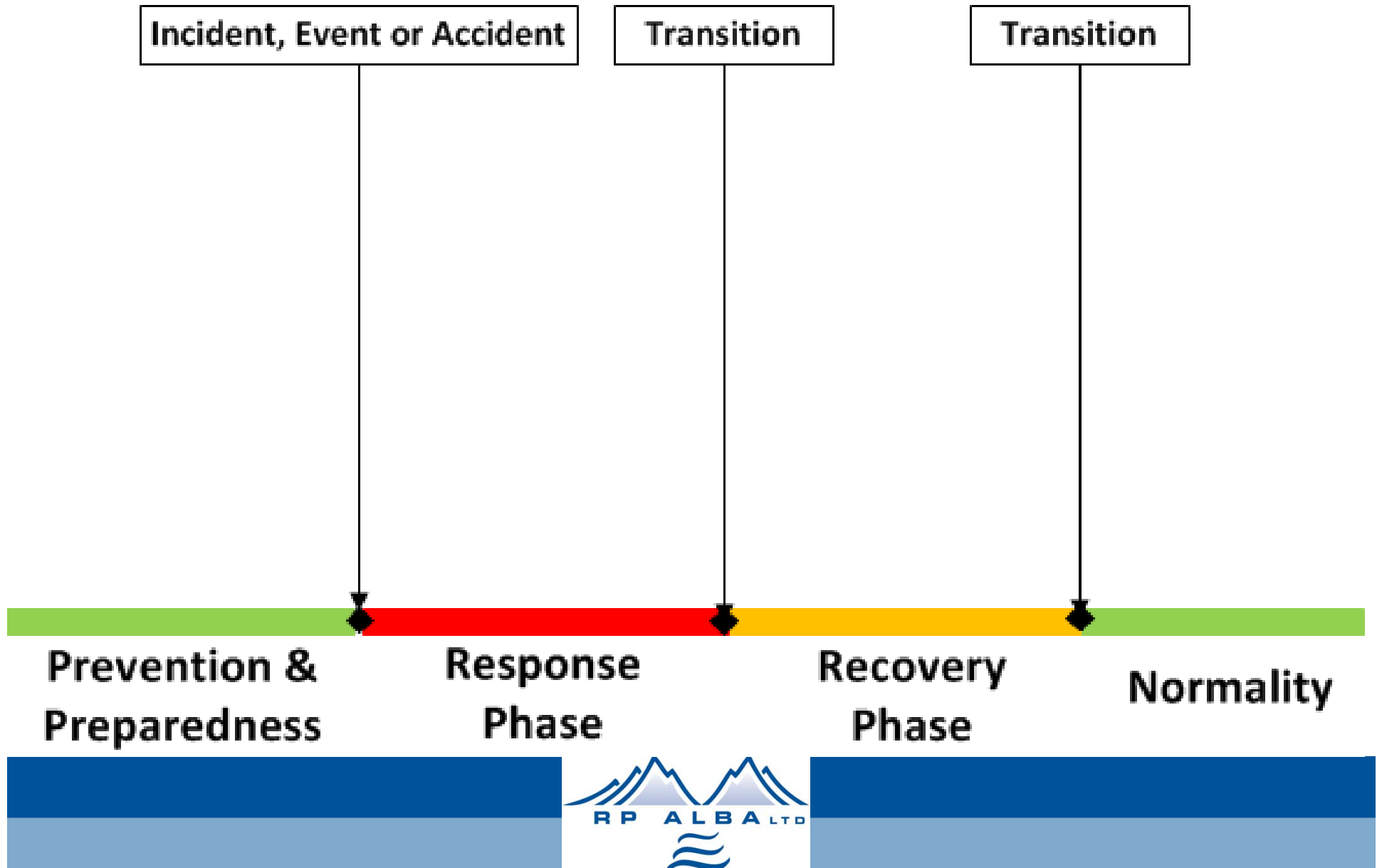
Prevention &
Preparedness

Response
Phase

Recovery
Phase



Return to normality



Return to normality

- Normality achieved when accident/incident is no longer dominant in the thinking of the affected people.



Returning to normality ?

- Chernobyl accident - 26th April 1986



- You can now take tours within the exclusion zone



Returning to normality ?

- Chernobyl accident - 26th April 1986

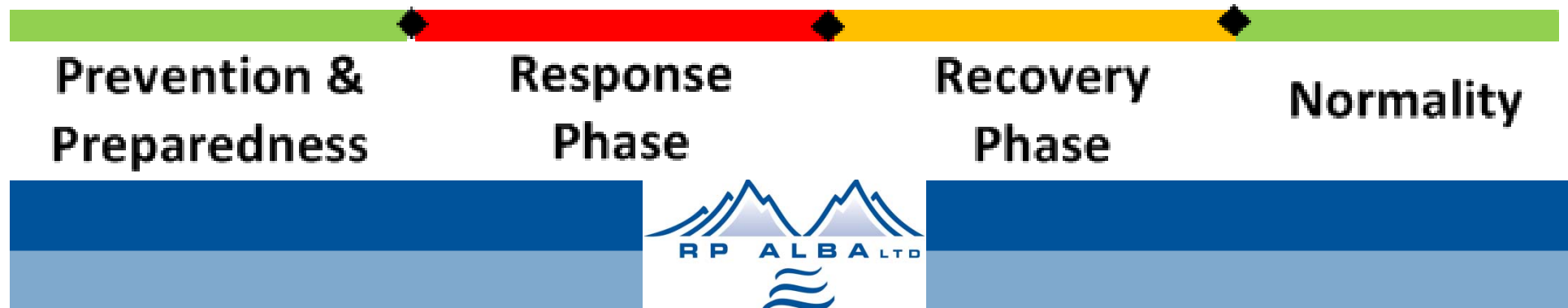


FOOD
STANDARDS
AGENCY

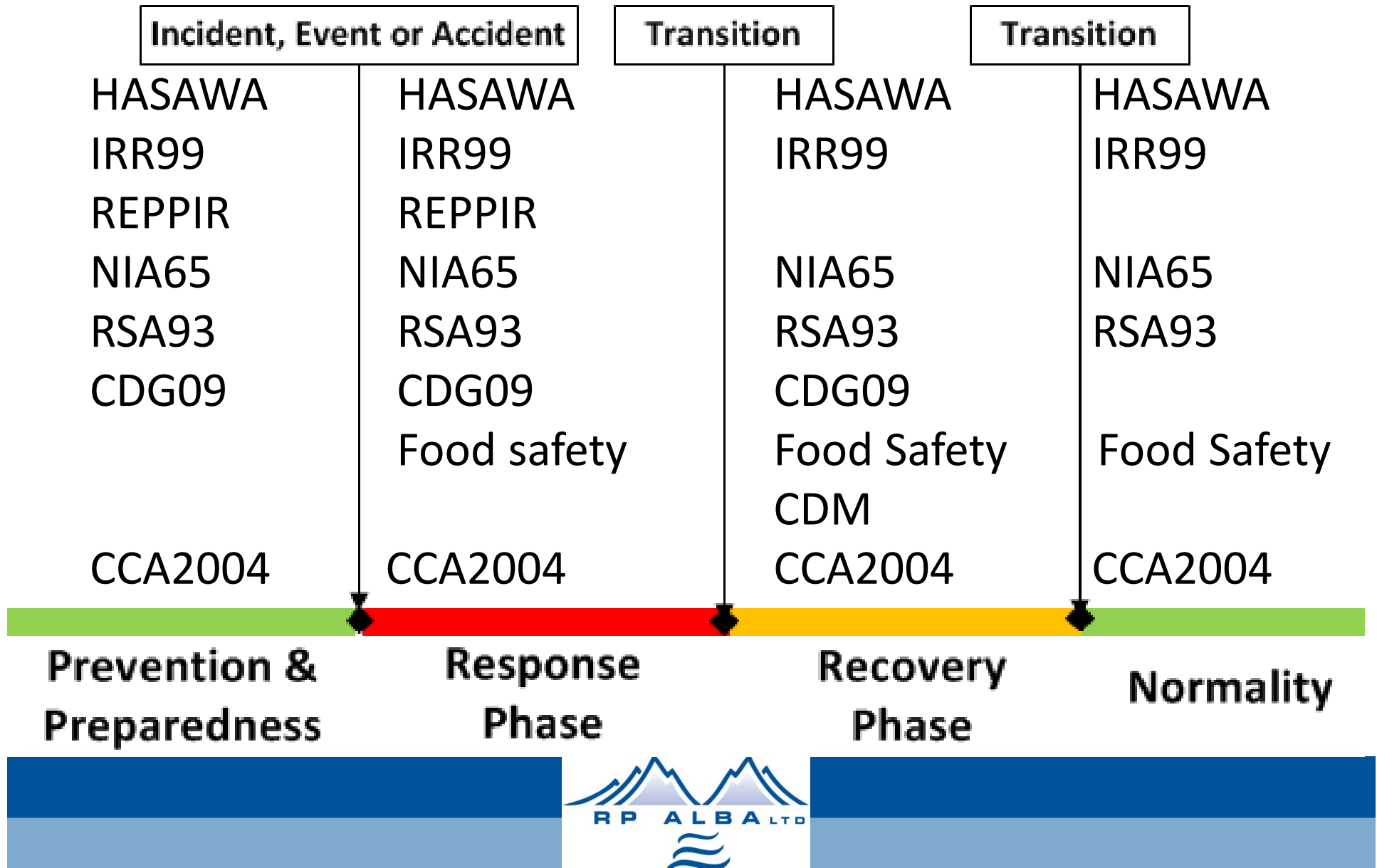
SCOTLAND

Buidheann
Inbhe-Bidhe
an Alba

- In 2008, 5 farms in Scotland still had restrictions on the sale of sheep (>1kBq/kg Cs-137 in meat)



Short Legislative Summary



Short Legislative Summary

- **Civil Contingencies Act 2004** contains the Government's generic emergency powers legislation
- There must be **no expectation** that the Government will agree to **use emergency powers** to deal with an emergency
 - Example: Radioactive Substances (Emergency Exemption) (England and Wales) Order 2006.



Summary

- **Identify** likely radiation incidents
- **Prevent** or mitigate them
- Have **contingency/emergency plans**
- **Practice** those plans
- **Expect** the unexpected
- Keep doses **ALARP**
- **Progress** towards normality in a considered way



Summary

"He who fails to plan is planning to fail"

Winston Churchill



Questions ?



**Prevention &
Preparedness**

**Response
Phase**

**Recovery
Phase**

Normality

