Contingency plans, recovery and remediation – the legislative context

Presenter: Bob Kerr
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
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

- Prevention & Preparedness
- Response Phase
- Recovery Phase
- Normality
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
• “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.
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.
• 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”.
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
• 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
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
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.
• “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.
“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.
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.
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)
Radiation Incident Occurs

Incident, Event or Accident

Prevention & Preparedness
Radiation Incident Occurs

Incident, Event or Accident

Prevention & Preparedness
Radiation Incident Types

- 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
Radiation Incident Types

- 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
Radiation Incident Types

• 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
International Nuclear Event Scale

1. ANOMALY
2. INCIDENT
3. SERIOUS INCIDENT
4. ACCIDENT WITH LOCAL CONSEQUENCES
5. ACCIDENT WITH WIDER CONSEQUENCES
6. SERIOUS ACCIDENT
7. MAJOR ACCIDENT

Below Scale / Level 0
NO SAFETY SIGNIFICANCE
Response / Emergency phase

Incident, Event or Accident

Prevention & Preparedness

Response Phase
- Enact the local contingency plan
- If required enact the emergency plan (on and off-site)
On site and off-site if appropriate:

- Introduction of countermeasures to deal with an immediate risk
- Interventions of limited duration and impact
IRR99 dose limits still apply in most cases.
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.
REPPIR 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;
- **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**;
- 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
• 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.
• 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
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.
• 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 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 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

NEVER MIND EARTH HOUR, I WISH WE COULD TURN THAT LIGHT OFF PERMANENTLY!

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 - 26\textsuperscript{th} April 1986

- You can now take tours within the exclusion zone
Returning to normality?

- Chernobyl accident - 26\textsuperscript{th} April 1986

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

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Prevention & Preparedness  |  | Recovery Phase |
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**RP ALBA LTD**
• **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

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
"He who fails to plan is planning to fail”

Winston Churchill
Questions?

EPIC FAIL
Sometimes, you just have no excuse.

Prevention & Preparedness  Response Phase  Recovery Phase  Normality