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REVISION HISTORY

Issue	Description	Date
00	First issue for INSA review	11.01.08
01	Integration of technical, co-applicant and INSA review comments	29.04.08
02	PCSR June 2009 update: – Inclusion of references – Clarification of text.	23.06.09
03	Consolidated Step 4 PCSR update: - Minor editorial changes, - Inclusion of references, - Creation of two new sub-sections: §1.1 “Radiological emergency” and §1.2 “Dose limitation for employees in special cases”, - Section 1.1: removal of the text on technical operators, addition of text explaining when a radiation emergency occurs, - Section 1.2: explanations on dose limits for special cases, - Section 2: addition of text on access needed during the first year post-accident, link to the dose limits quoted in section 1.2, and measures taken to ensure that access is possible in the respect of the dose limits, - Table 1: updated consistent with post accident studies.	27.03.11
04	Consolidated PCSR update: - References listed under each numbered section or sub-section heading numbered [Ref-1], [Ref-2], [Ref-3], etc - Addition of the reference “Provisional HSE Internal Guidance on Dose Levels for Emergencies” - Removal of the reference “The Licensing of Nuclear Installations. UK Health and Safety Executive (HSE). April 2007 (E)”	27.09.12

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SUB-CHAPTER 12.5 – POST-ACCIDENT ACCESSIBILITY

The purpose of this sub-chapter is to define the systems and their components for which access is required in long term post-accident situations and to specify accessibility conditions.

Post-accident accessibility is defined, according to the category of accident considered, for the systems used to maintain long-term cooling of the plant (over a year) and long-term cooling of the fuel pool.

This sub-chapter only covers radiation protection issues. Information on Emergency Arrangements is given in Sub-chapter 18.3.

1. STATUTORY REQUIREMENTS

1.1. RADIOLOGICAL EMERGENCY

The statutory text (see also Sub-chapter 12.0) that specifies the conditions of intervention in an radiological emergency is contained in Regulations 14 and 15 of the Radiation Emergency Preparedness and Public Information Regulations 2001 (REPPIR) [Ref-1] and Regulations 14 and 23 of the Ionising Radiations Regulations 1999 (IRR99) [Ref-2]. There are also specific provisions in Site Licence Conditions 7 and 11 under the Nuclear Installations Act 1965 (as amended) [Ref-3].

Intervention in a radiological emergency is required when there is a risk of dose exposure for members of the public.

Emergency recovery actions are required to be risk assessed and an estimation of the potential dose uptake is a part of this assessment. If needed, emergency dose levels may be authorised. Intervention personnel may be exposed to doses in excess of the dose limits in the Ionising Radiations Regulations 1999 (IRR99) [Ref-2]. The **emergency dose levels** quoted below are those that are normally regarded as acceptable within UK regulations [Ref-4]:

- **Effective Dose:** 100 mSv
- **Equivalent Dose to Skin:** 1000 mSv
- **Equivalent Dose to Eye Lens:** 300 mSv

Specific provision may be made explicitly for life saving. In this case it should be recognised that regulation 14(7) may take precedence over regulations 14(2), 14(3) and 14(4) of REPPIR. However, it is desirable that for planning purposes the target should normally apply the following levels:

- **Whole Body Dose:** 500 mGy
- **Dose to Skin:** 5000 mGy

*(Doses quoted above in milli Gray are for deterministic effects).

It should also be noted that Regulation 14 of REPPIR does not apply to individuals who receive their dose as a direct consequence of an accident, but to those who intervene. The statutory requirements for doses due to accidents are covered by Regulation 23 of the IRR99.

Where an effective dose is in excess of 6 mSv, (or 3/10ths of any relevant dose limit), the radiation employer must put into place reasonable provision to ensure that an accurate dose assessment is made. This can be achieved by ensuring that all relevant workers are Classified or if not Classified issued with a dosimeter.

It is also a requirement that the employer has access to a dosimetry service that is approved by the UK regulator to assess accident doses in excess of the normal operational levels, (for example greater than 500 mGy). It is not usual for most ADS (Approved Dosimetry Services), to be approved to offer this service.

Accident dosimetry may be based on the examination of biological specimens or computational estimates. All assessments must be reviewed by the employer's Radiation Protection Advisor.

1.2. DOSE LIMITATION FOR EMPLOYEES IN SPECIAL CASES

Regulation 11 of the Ionising Radiations Regulations 1999 (IRR99) [Ref-1] defines that, in some cases, because of the nature of the work undertaken by an employee, it may not be practicable to comply with the annual limit of 20 mSv for adult employees. This situation may arise where there are skilled tasks which need to be undertaken by key specialist staff. Where the employer can demonstrate that this is the case, the acceptable dose limits are:

- Effective dose of 100 mSv in any period of five consecutive calendar years
- Effective dose of 50 mSv in any single calendar year
- Equivalent dose for the skin of 500 mSv in a calendar year
- Equivalent dose for the lens of the eye of 150 mSv in a calendar year
- Equivalent dose for the hands, forearms, feet and ankles of 500 mSv in a calendar year

2. ACCESS REQUIREMENTS

The redundancy of the systems required to maintain:

- the safe state in a PCC scenario,
- the final state in a RRC-A scenario,
- the controlled and stable states in a RCC-B scenario,

associated with the qualification of the equipment which constitute these systems makes the need to access the plant both immediately post-accident and during the first year post-accident unnecessary.

However, equipment qualification is time-limited and therefore accessibility to the rooms containing the equipment is required one year after the accident for maintenance and/or repair.

Access is thus allowed if dose limits do not exceed those specified in section 1.2 of this sub-chapter. Provisions have been taken to ensure that both access and work are possible in respect of these limits [Ref-1].

A list of post-accident access requirements has been defined in Sub-chapter 12.5 - Table 1, and is the result of an analysis carried out on the following basis [Ref-1]:

- definition of the systems used in the long term phase (about a year) after an accident, and for which operability is absolutely necessary, *i.e.* the systems used to maintain the plant in a steady state after an accident and to maintain cooling of the spent fuel pool.
- identification of the components of these systems which will require repair during the post-accident phase,
- definition of the most unfavourable conditions in which an intervention may be proceeded:
    - in events with no core melt (PCC-4)
    - or core melt accidents (RRC-B)
- definition of operations to be carried out before access in order to prepare for the repairs.

SUB-CHAPTER 12.5 – TABLE 1

List of Access Requirements in Post-Accident Phase

Systems and rooms	Conditions	Components	Work necessary before access
RIS [SIS] - LHSI SABs 1/4 : HLF/HLI0106ZL SABs 2/3 : HLG/HLH0109ZL	PCC-4	Pumps	Isolation, draining, rinsing of the pipes; to fill up with clean water
RIS [SIS] - LHSI SABs 1/4 : HLF/HLI0505ZL SABs 2/3 : HLG/HLH0506ZL	PCC-4	Exchangers	Isolation, draining, rinsing of the pipes; to fill up with clean water
EVU [CHRS] SABs 1/4: HLF/HLI0108ZL	RRC-B	Pumps	Isolation, draining, rinsing of the pipes; to fill up with clean water Floor decontamination (in case of leaks)
EVU [CHRS] SABs 1/4: HLF/HLI0512ZL	RRC-B	Main exchangers	Isolation, draining, rinsing of the pipes; to fill up with clean water Floor decontamination (in case of leaks) To schedule additional shielding on pipes
RRI [CCWS] as a cooling system of the RIS [SIS] LHSI and PTR [FPCS] main trains	All accident sequences	The upstream valves and the downstream valves from the heat exchangers	None (RRI [CCWS] assumed non-contaminated)
PTR [FPCS] FB: HK0126ZL, HK0127ZL, HL0176ZL, HK0177ZL	RRC-B	Pumps	None (to wear Respiratory Protection)
PTR [FPCS] SAB1: HLF0507ZL	RRC-B	3rd train pump	Isolation, draining, rinsing of the pipes; to fill up with clean water Floor decontamination (in case of leaks)
EDE [AVS] FB: HK1781ZL, HK1782ZL, HK1783ZL, HK1784ZL	All accident sequences	Fans, heaters, iodine traps, HEPA filters	None (to wear Respiratory Protection)
EBA [CSVS] low capacity FB: HK2481ZL, HK2485ZL	All accident sequences	Fans, heaters, iodine traps, HEPA filters	None (to wear Respiratory Protection)
DWL [CSBVS] FB: HK2181ZL, HK2182ZL, HK2183ZL, HK2184ZL	All accident sequences	Fans, heaters, iodine traps, HEPA filters	None (to wear Respiratory Protection)
DWL [CSBVS] SABs 1/4: HLF/HLI0108ZL SABs 1/4: HLF/HLI1004ZL SABs 2/3: HLG/HLH1002ZL SAB 1: HLF0507ZL	All accident sequences	Cooling units	See access to EVU [CHRS] and PTR [FPCS] pumps
DVL [SBVSE] SAB: outside the controlled zone	All accident sequences	Fans, heaters, humidifiers, cold batteries	None
DCL [CRACS] SABs: outside the controlled zone	RRC-B and Contamination of the site air due to an external event to the plant	Fans, heaters, iodine traps, HEPA filters	None

SUB-CHAPTER 12.5 – REFERENCES

External references are identified within this sub-chapter by the text [Ref-1], [Ref-2], etc at the appropriate point within the sub-chapter. These references are listed here under the heading of the section or sub-section in which they are quoted.

1. STATUTORY REQUIREMENTS

1.1. RADIOLOGICAL EMERGENCY

[Ref-1] The Radiation (Emergency Preparedness and Public Information) Regulations 2001 (REPPIR). Statutory Instrument 2001 No. 2975. ISBN 0-11-029908-6. HM Stationery Office. (E)

[Ref-2] The Ionising Radiations Regulations 1999. Statutory Instrument 1999 No. 3232. ISBN 0-11-085614-7. HM Stationery Office. (E)

[Ref-3] The Nuclear Installations Act 1965 (as amended). ISBN 0108502163. HM Stationery Office. (E)

[Ref-4] Provisional HSE Internal Guidance on Dose Levels for Emergencies. HSE. 2008. (E) http://www.hse.gov.uk/radiation/ionising/doses/dose-pr.htm

1.2. DOSE LIMITATION FOR EMPLOYEES IN SPECIAL CASES

[Ref-1] The Ionising Radiations Regulations 1999. Statutory Instrument 1999 No. 3232. ISBN 0-11-085614-7. HM Stationery Office. (E)

2. ACCESS REQUIREMENTS

[Ref-1] Access to the Safeguards Buildings and the Fuel Building in a long term post accident situation (PCC4 and RRC-B). ECEIG101497 Revision A1. EDF. February 2011. (E)

ECEIG101497 Revision A1 is the English translation of ECEIG101497 Revision A.