Procedure for dose management at Forsmark NPP during severe conditions

ISOE European Symposium on Occupational Exposure Management at Nuclear Facilities
Prague, Czech Republic
20-22 June 2012

Staffan Hennigor (sig@forsmark.vattenfall.se)
Forsmark NPP

General

- This procedure is only intended for ”Planned exposures in emergency situations”
  - Where dose limits/ dose constraints for normal operation are not valid

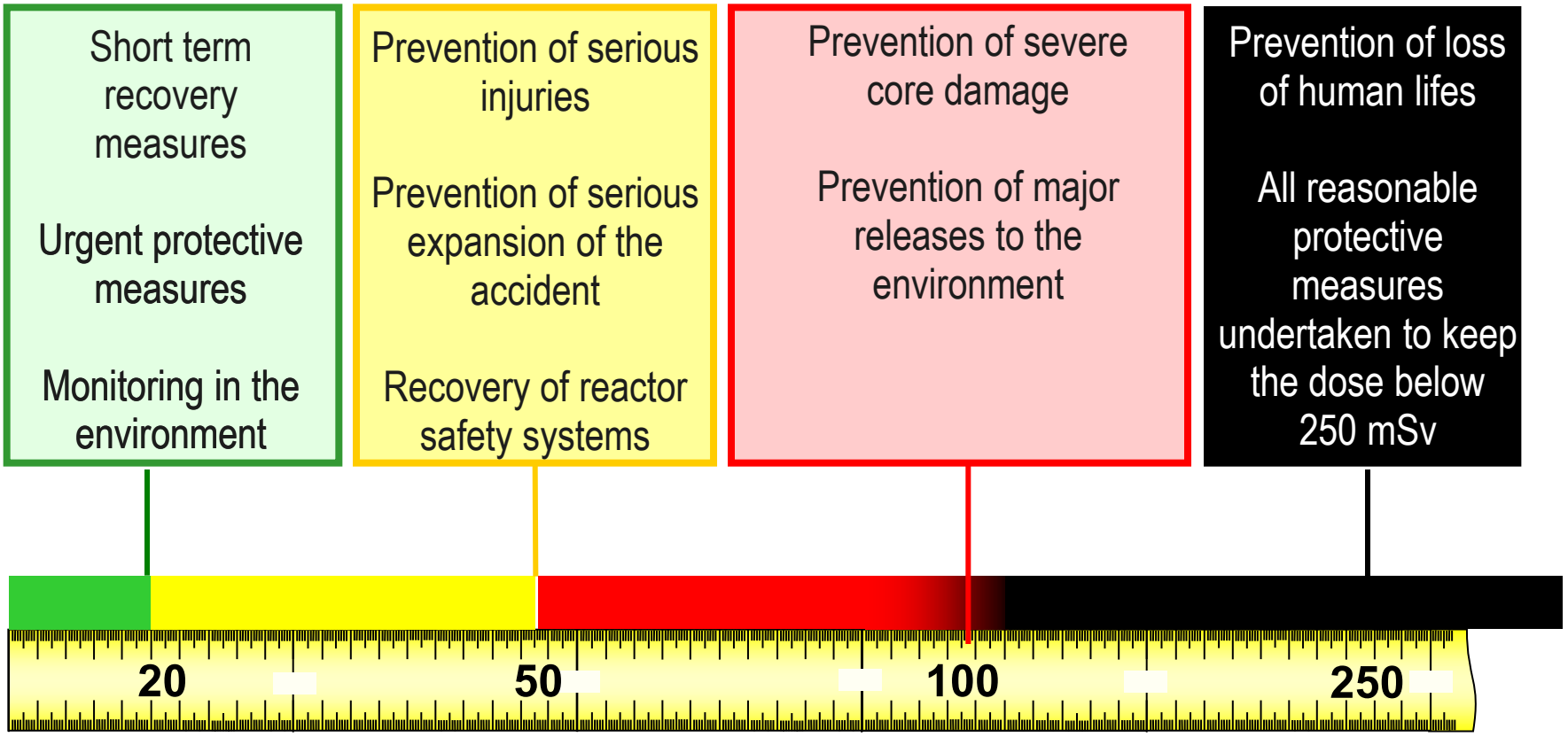
The complete procedure (in english) may be found at the ISOE website

- It is a theoretical procedure not tested during dire conditions
  - For example only one affected reactor unit is assumed
  - The practical problems during Station black-out are underestimated

General Procedure

1. All steps must be well documented
2. Assessment of anticipated doses during the operation
3. Planning of the operation (RP Manager), approved by Site Manager
4. Pre Job Briefing for all personnel involved
5. The operation is executed
6. After the operation doses received are assessed
7. Briefing of actual situation for when change of personnel

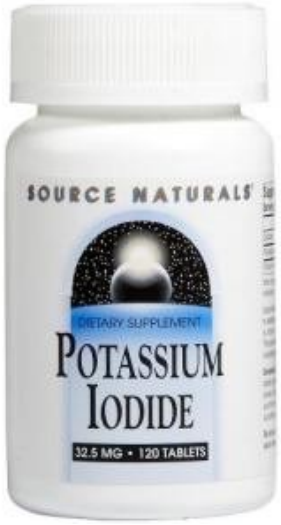
Dose Constraints applied



Exposures in excess of 100 mSv restricted to once in a lifetime

Also to be considered

- Both TLD and EPD shall be worn
  - Dose constraints applies to EPD reading



- Dose constraints are based on external gamma exposure
  They shall be modified according to:
  - If no intake of iodine pills before the operation
    = The dose constraint value x 0,2
  - If risk for air contamination and no breathing protection is used
    = The dose constraint value x 0,5
  - If risk for exposure to unprotected skin
    = Consider also beta radiation (no multiplying factor given)

EPD dose & dose rate alarms

- If dose constraint ≤ 20 mSv:
  - EPD dose alarm set to 15 mSv
  - EPD dose rate alarm set to 50 mSv/h
- If dose constraint ≤ 50 mSv:
  - EPD dose alarm set to 15-40 mSv
  - EPD dose rate alarm set to 50 mSv/h
- If dose constraint ≤ 100 mSv:
  - EPD dose alarm set to 15-85 mSv
  - EPD dose rate alarm set to 50 mSv/h

Quick reference guide

Time (min)	Dose (mSv)							
60	1	3	5	10	15	25	50	
45	0,75	2,25	4	8	11	19	38	
30	0,50	1,50	2,5	5	8	13	25	
15	0,25	0,75	1,3	2,5	4	6	13	
10	0,17	0,50	0,8	1,7	2,5	4	8	
5	0,08	0,25	0,4	0,8	1,3	2	4	
3	0,05	0,15	0,25	0,5	0,75	1,3	2,5	
1	0,02	0,05	0,08	0,2	0,25	0,4	0,8	
	1	3	5	10	15	25	50	Dose rate (mSv/h)

WHITE = Low doses, no need for protective measures exceeding those in position 1 in the table on page 8-3

YELLOW = Radiation doses below EPD dose alarm (15 mSv), extra protective measures shall be considered

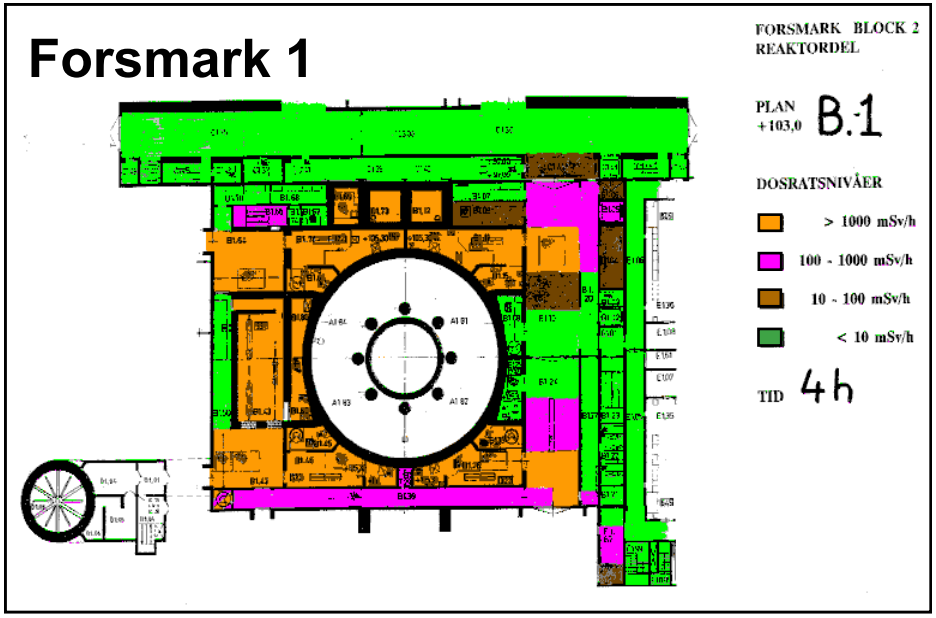
RED = Radiation doses exceeding EPD dose alarm (15 mSv), extra protective measures highly recommended

Dose rate lay-outs for the Reactor buildings

- All floors/levels in the Reactor buildings have been marked according do projected dose rates after a core melt
  - **Green** = < 10 mSv/h
  - **Brown** = 10 – 100 mSv/h
  - **Purple** = 100 – 1 000 mSv/h
  - **Orange** = > 1 000 mSv/h

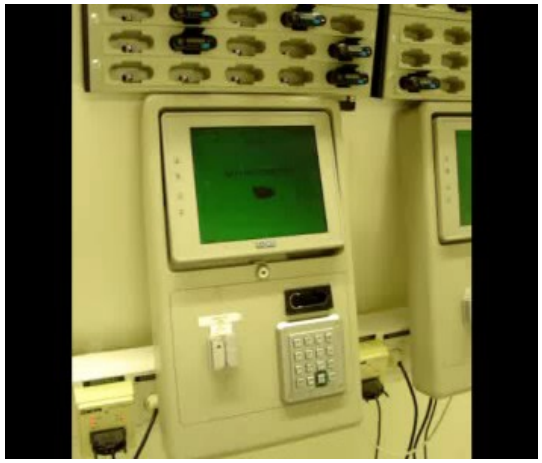
- Lay-outs for the following times after scram
  - 4 hours
  - 24 hours
  - 7days
  - 30 days

- **Showing worst case scenario**



Problems

- Will the dosimeters (TLD + EPD) be available?
- Will the EPD:s be operable if Station Blackout?
- How may internal doses be assessed if no whole body counter is available at or near site?



Thanks for Your attention!
– Any questions?