

IJ. van der Plas

2.2(3)-a.3

The containment should consist of a primary and a secondary containment. The primary containment withstands high pressures and temperatures generally resulting from LOCAs. The secondary containment surrounds the primary containment and provides mainly a protection against external hazards. During normal operation pressures lower than atmosphere contribute in preventing uncontrolled leakage from the containment (without it is passing filters and chimney).

2.3(1)

As an extension on the 3 fundamental safety functions a list of 6 critical safety parameters may be defined to be used in emergency operations: subcriticality, core cooling, heat sink, confinement, inventory and pressure retaining. Reference is given by the Critical Function Monitoring System (CFMS) from EPZ, Borssele.

2.4(1)

Add tidal influences and earth quake to the list of phenomena.

2.6(1) page 15, table

First line, right column:	Maximum allowable effective dose (over 70 years) <u>per person</u>
Second line, left column:	$F > 10^{-2}$ <u>to normal operation</u>

2.6(1)

10 persons related to  $10^{-5}$  is not very clear; would this be  $10^{-7}$  ?

3.1(2)

Add a topic I):

Maintaining plant knowledge and ensuring financial resources a.o. for support from architect engineers and vendors over the lifetime of the plant. (Reference IAEA-INSAG-19)

3.1(6)-b

Add behind the first sentence:

Accidental circumstances are to be postulated at the end of service life.

3.1(11)

In The Netherlands an autarchy time of 72 hours including cold shut down is normal practice. (See also 3.3.5)

3.3(5)

Residual heat removal

In the PWR design it is common practice to combine the 3 functions residual heat removal, low pressure injection to the core and sump operation in one redundant system. However the circulation of sump water after a primary leak accident brings the risk of internal blocking of the core by debris from damaged isolation materials. (the so-called BWR Barsebäck problem) Solutions are tried out by suction filters which bring little reliability. In our opinion safety may be considerably increased by having separate sump circulation systems with sufficient redundancy, based on sewage type pumps combined with batteries of multiple discharge filters which could be cleaned by staggered back flushing during operation.

Add 3.3(7)

Heat sink

In the PWR design a temporary passive heat sink straight after reactor shut down may be assured by large secondary inventories in the steam generators. Therefore if a reactor shut down is needed, predicting instrumentation systems should act early and prevent that such a shut down occurs at low steam generator water level.

3.6(8), 1° topic

Add a sentence:

A water spray system with a soluble neutron absorber should suppress radioactivity and pressure in the containment atmosphere.

3.6(8), 2° topic

Add a sentence:

If at accidental circumstances a high hydrogen development may be expected (like in boiling water reactors), the containment atmosphere should be purged by an inert gas before starting any operating period. (Reference: the Fukushima accident)

3.6(10)

Reference: aforementioned remark due to 3.3(5).

3.7(8)

Add a sentence:

Verification of control loops and tuning of parameters should be prepared with support of simulation of the controlled processes. Before commissioning and first start the operation crew should be trained utilizing a full scope replica simulator of the plant.

3.8(4)

Extend the 1° sentence: ..... during and after external and internal accidents.

3.10(1)

Subcriticality of fuel in the pool shall also be maintained if there would be no soluble neutron absorber in the water.

(Reference: Belgian reactors which ensure enough mutual distance between stored fuel rods to prevent recriticality also if there would be no boron in the water.)

3.10(3)

At level 1 the pool water temperature shall be low enough to not jeopardizing the worker's environment.

Chapter 7 Documentation

This chapter should briefly mention topics like management objectives, safety culture, configuration control (IAEA Technical Report Series No.65) and Design Authority (IAEA-INSAG-19) for which reference may given to the future guideline on organisation and management.