LONG-TERM STATION BLACKOUT

Part of the RASCAL Instructor-led Training

LTSBO - Background

In a Long-Term Station Blackout, a facility will lose all offsite and onsite AC power. Cooling is initially maintained using diesel generators and batteries. However, after these are exhausted, water in the core will start to heat and eventually boil. RASCAL models this heatup time as 8 hours in a PWR and 6 hours in a BWR. After the core is fully uncovered, fission products begin to release.

The source term model for LTSBO in RASCAL is based on the State-of-the-Art Reactor Consequence Analysis (SOARCA) reports.

LTSBO - SCENARIO

Barakah Unit 2, was shutdown at the same time as Unit 1, 10:00, due to the event which caused the Unit 1 LOCA.

All offsite and onsite AC power was lost.

LTSBO - SCENARIO

Diesels initially provided power and cooling was maintained. However, 5 hours after the original event, further technical complications incapacitated the diesels. The batteries lasted six hours.

Given the models in RASCAL, at what time does the core heat up to the point of damage/release?

Fission products leak through a slightly damaged containment at 2.0 percent/d with no sprays available.

Finally, power is restored and the core is recovered at 10:00 on the next day. Containment pressure was reduced to atmosphere at noon.

LTSBO - SCENARIO

Use the following weather data for the BK12 station

Type	Date	Time	Wind Dir (deg)	Wind spd (m/s)	Stability Class	Precip	Air Temp (Deg C)
Obs	Today	12:00	210	3	B	None	11
Fcst	Today+1	00:00	210	3	B	None	11
Fcst	Today+1	04:00	340	2	D	None	9
Fcst	Today+1	08:00	350	3	C	None	10
Fcst	Today+1	12:00	0	4	B	None	19

- Why is there a large variation in direction between 8:00 and 12:00?
- Then why did we get a warning message?

LTSBO - TASK

Do an assessment of the Unit 2 LTSBO and record the TED and Child Thyroid CED at 0.8 and 8 km from the release.

Dose	Distance from the Site	
	0.8 km	8.0 km
TED (Sv)		
Child Thyroid CED (Sv)		

LTSBO - RESULTS

Dose	Distance from the Site	
	0.8 km	8.0 km
TED (Sv)	4.5E-01	1.6E-02
Child Thyroid CED (Sv)	7.5E+00	3.6E-01

Conclusions?

- Release timing vs LOCA