


# 2 example RDD cases to use in Singapore TTX – for comment

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# Dispersal Pattern

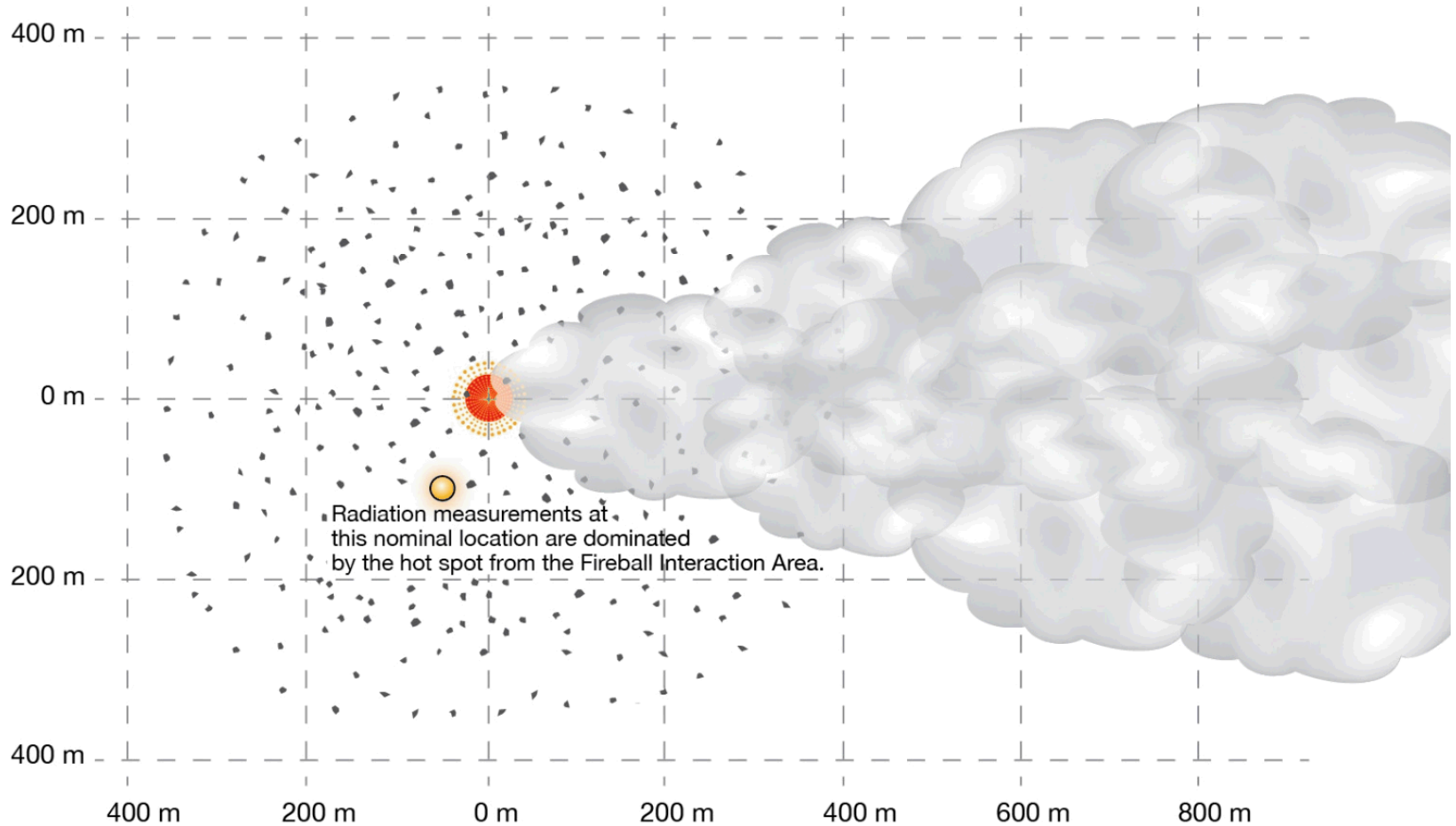
 Fireball Interaction Area (< 100  $\mu\text{m}$ , about 5% of material in fireball)

 Large Particles ( $\approx$  100 - 500  $\mu\text{m}$ )

 Ballistic Fragments (> 1 cm)

 Downwind Fallout (small particles)

Prevailing Wind 



# Fate of dispersed material (based on experimental observations)

- The original particle size distribution for the device is determined experimentally (for example, in the SNL aerosolization chamber) – very clean
  - No agglomeration
  - No fireball surface interaction
- Particles > than 100  $\mu\text{m}$  (AED) have enough inertia to escape the fireball, are dispersed ballistically, and deposit in the near field
  - Smaller particles (< 100  $\mu\text{m}$ ) are stopped by the decelerating explosive product gases and remain in the fireball
  - Ballistic particles generally exit the fireball with velocities close to 1000 m/s
- A fraction of the smaller particles (< than 100  $\mu\text{m}$ ) remaining in the fireball deposit on the ground during the turbulent fireball ground interaction
  - On a clean surface, about 3 % of the particles deposit within 4 fireball radii
  - On a dirty surface, about 20 % of the particles deposit within 4 fireball radii
- In the case of a dirty surface (loose dirt) about 4 % of the smaller particles combine (agglomerate) with dirt particles and increase in effective size
  - This fraction disperses down wind and deposits in the near field based on the new larger particle size distribution (we are currently using 70 – 130  $\mu\text{m}$ )
- The remaining particles are dispersed downwind and deposit in the near and the far field based on the original particle size distribution

## Parameters for 2 RDD examples for TTX

Nuclide		Cs-137		Se-75	
		Clean	Dirty	Clean	Dirty
Surface type					
Activity (Ci)		1500	1500	160	160
Initial Particle Size Distribution (fraction of original activity)	0 - 10 $\mu\text{m}$ (lognormal)	0.5	0.5	0.8	0.8
	10 - 100 $\mu\text{m}$ (linear)			0.1	0.1
	100 - 500 $\mu\text{m}$ (linear)	0.5	0.5	0.1	0.1
	Frag				
Amount HE (kg)					
Stagnated FB radius (m)		3.23	3.23	3.23	3.23
Radius of fireball/surface interaction area (m)		11.31	11.31	11.31	11.31
Deposition in fireball/surface interaction area (Ci) -- applicable to 0 - 100 $\mu\text{m}$ particles (3 % for clean surface, 20 % for dirty surface)		22.5	150	4.32	28.8
Radius of deposition of ballistic particles (m)		30	30	30	30
Deposition of ballistic particles (Ci) -- applicable to 100 - 500 $\mu\text{m}$ particles		750	750	16	16
Material dispersed downwind in modified size distribution -- linear distribution 70 - 130 $\mu\text{m}$ from agglomeration (Ci) -- applicable to 0 - 100 (4 %)			30		5.12
Material dispersed downwind in original size distribution (not agglomerated) - Ci -- applicable to 0 - 100 $\mu\text{m}$		727.5	570	139.68	110.08