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## SCENARIO PLANNING ASSUMPTIONS: SMALLPOX EPIDEMIOLOGY

### Total Infected During Attacks: 84,000

- 8,000 infected in Istanbul on January 1 (Grand Bazaar)
- 16,000 infected in Frankfurt on January 2 (Frankfurt Airport)
- 8,000 infected in Rotterdam on January 2 (Metro)
- 12,000 infected in Warsaw on January 2 (Metro)
- 16,000 infected Los Angeles on January 4 (LAX airport)
- 24,000 infected in New York on January 4 (Penn Station)

**Emergence of Cases:** Epidemiological curve for the emergence of smallpox cases was based on: Figure 4.7, in Fenner, et al., *Smallpox and Its Eradication*. Geneva, Switzerland: World Health Organization; 1988:188.

It was assumed that:

- Smallpox symptoms began (as early as 7 days after infection) with 2 days of fever, followed by a rash.<sup>1</sup>
- Initial diagnoses in European countries on January 13 were made in people who had at least day 3 of rash. This assumption is based on pictures in Fenner, et al.,<sup>2</sup> and the expert medical opinion of the Center for Biosecurity's medical doctors, including Dr. D. A. Henderson.
- By January 14, numbers of suspect smallpox cases would begin to reflect reports of smallpox cases in much earlier stages of development (day 1, 2, or 3 of rash). Once the attacks are recognized, smallpox will be suspected in people who exhibit rash or fever but who are, in fact, not infected with smallpox.

**Accumulation of cases** from 9 a.m. to 1:30 p.m. on January 14 (start to end of exercise) was calculated based on the assumption that by 1:35 p.m. EST on January 14, between 10% and 30% of patients with day one rash and beyond would be reported to health authorities. These reports would include some "false positive" cases.

**Calculations of total casualties and deaths for the final video:** We assumed a 25% case fatality rate. We assumed a modest decrease in the historic case fatality rate of 30% due to access to modern health care for some victims and some degree of residual immunity in a modest number of adults vaccinated before 1980.

- Person-to-person spread in the first generation of cases was 1:3 in all countries.<sup>3</sup>
- Person-to-person spread in second generation was 1:0.25
- This lower transmission rate is used because highly effective disease control measures had been established by mid-February, including vaccination of millions of contacts and healthcare workers in all the countries that were attacked.
- It was assumed that leaders of countries with large vaccine stockpiles would share vaccine with affected countries that had small vaccine stockpiles.
- It was also presumed that large-scale vaccination would begin within days after January 14, that countries would impose strict isolation of cases, and that residents in affected countries would self-impose social distancing (e.g., cancellation of big public events).
- The spread and fatality assumptions were necessary to create a final video that depicted a possible outcome of the players' decisions. The *Atlantic Storm* participants may have chosen different actions than what exercise designers believed they would take.

Site of Attacks	1st Generation visible by ~Jan 21	2nd Generation visible ~Jan 21 to Feb 3 (rate of spread = 1:3)	3rd Generation ~Feb 3 to Feb 28 (rate of spread=1:0.25)	Cumulative cases / deaths by end of February
U.S.	40,000	120,000	30,000	190,000 / 47,500
Netherlands	8,000	24,000	6,000	38,000 / 9,500
Germany	16,000	48,000	12,000	76,000 / 6,250
Poland	12,000	36,000	9,000	57,000 / 14,500
Turkey	8,000	24,000	6,000	38,000 / 9,500

<sup>1</sup> Fenner F, Henderson DA, Arita I, Jezek Z, Ladnyi ID. *Smallpox and Its Eradication*. Geneva, Switzerland: World Health Organization; 1988:1460.

<sup>2</sup> Ibid.

<sup>3</sup> Centers for Disease Control and Prevention. What We Learn about Smallpox from Movies—Fact or Fiction? Available at: <http://www.bt.cdc.gov/agent/smallpox/disease/movies.asp>. Accessed January 5, 2005.