

inappropriate assumptions were used in the uSSRA that led to artificially lower estimates of the probabilities and amounts of pathogen released.

In contrast with the 2010 SSRA, which cited fomites and lack of respiratory protection as the most likely pathways of accidental FMDv release, the uSSRA concludes that the most likely release mechanisms are those associated with natural hazards, specifically earthquakes and tornadoes. The uSSRA concludes that these are about 20 times more likely than operational pathways.

Despite improvements, the committee finds that the uSSRA underestimates the risks of pathogen release and infection and inadequately characterizes the uncertainties in those risks. The committee finds that the extremely low probabilities of release are based on overly optimistic and unsupported estimates of human error rates, underestimates of infectious material available for release, and inappropriate treatment of dependencies, uncertainties, and sensitivities in calculating release probabilities.

The committee is concerned that the vanishingly small estimates of risk found throughout the uSSRA are inconsistent with most modern, complex industrial systems. In many instances, the committee could not verify uSSRA results, because methods and data were unevenly or poorly presented. The uSSRA also contains inconsistent information, which made it difficult to interpret data or to reconstruct risk scenarios and thereby made it difficult to determine the degree to which risks were underestimated.

The committee recognizes that significant complexities accompany a risk assessment of this nature, yet the practice of risk analysis is sufficiently mature to be able to treat such complexities (Kumamoto and Henley, 1996; NASA, 2011) and therefore the committee's expectations for such a risk assessment are customary and attainable. The number of facilities comparable with the NBAF is small, so there is little empirical validation of the risk estimates. However, because a pathogen release from the NBAF could have devastating widespread agricultural, economic, and public health consequences, a risk assessment that reaches inappropriate conclusions could have substantial repercussions.

The committee has identified a number of deficiencies that lead to the conclusion that the uSSRA continues to be inadequate in characterizing the risks associated with operating the NBAF in Manhattan, Kansas.

## FINDINGS

### Congressional Mandate

**Finding 1: The uSSRA addresses many, but not all, of the issues outlined in the congressional mandate.** In 2010, a National Research Council committee found that the initial SSRA was not entirely adequate or valid, because of methodological limitations and assumptions that underestimated the risks and economic costs associated with an accidental FMDv release from the Manhattan, Kansas, site (NRC, 2010). The uSSRA attempts a quantitative risk assessment and attempts to model FMDv release and infection from the proposed NBAF in Manhattan, Kansas. However, it does not adequately include overall risks associated with the most dangerous pathogens in its biosafety level 4 (BSL-4) assessment.