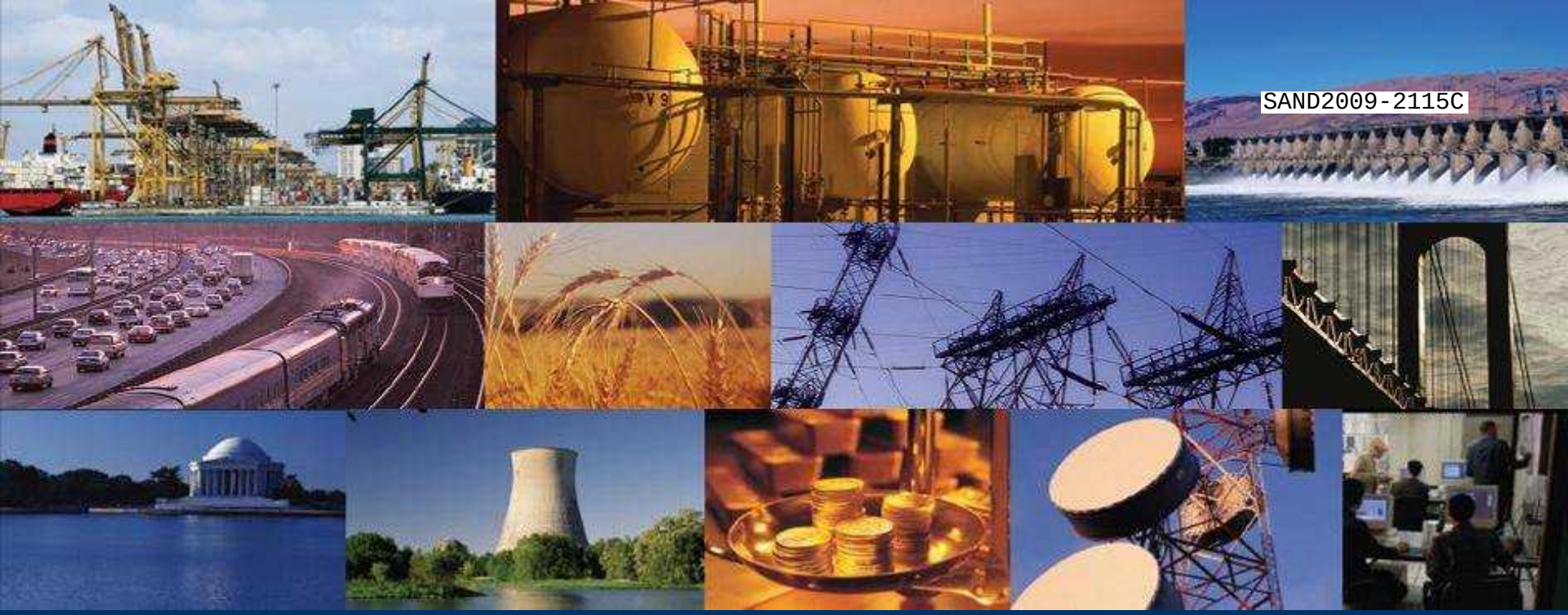


Office of Infrastructure Protection (IP)

National Infrastructure Simulation and Analysis Center (NISAC) Branch; *High-level Assessment of Terrorist Risk to the U.S. Food Supply*

Daniel J Pless, Paul Kaplan, Steve Conrad, Gregory Wyss, Ron Rhea, Richard Aguilar, Consuelo Silva: Sandia National Laboratories

Homeland Security

UNCLASSIFIED

NISAC Mission

To provide consequence analysis products and services using unique complex modeling and simulation capabilities that inform national, Department of Homeland Security (DHS), and intergovernmental leaders; National Infrastructure Protection Program (NIPP) partners; and others of impacts on global, national, and regional interdependent systems of systems, due to natural or manmade events, in near-real-time and as required.

NISAC Branch Goals

- **Crisis action planning and operations.**
  - **Measure: Percentage of valid requests for information (RFIs) from Homeland Infrastructure Threat and Analysis Center (HITRAC) or NIPP partners answered for consequence analysis of interdependent systems during a crisis and for which funds are budgeted.**
- **Contingency planning and policy analysis.**
  - **Measure: Percentage of forecast annual and multi-year modeling, simulation, and analysis products, for consequence and other analyses, required by strategic planners or policy analysts, delivered on time and within budget and for which funds are budgeted.**
- **Strengthen modeling, simulation, and analysis capabilities to meet national competency objectives.**
  - **Measure: Percentage of validated modeling, simulation, and analysis capability gaps/requirements identified for strategic planning, policy analysis, and risk management framework, identified by DHS headquarters, DHS components, and NIPP partners, submitted through appropriate channels for resourcing consideration.**

NISAC Partners in Food Defense

- **Non-Disclosure Agreement with AON Corporation**
  - Introductions to large corporations
  - Guidance on global risks to critical infrastructure
  - Input during catastrophic events
  - Facilitated National Center for Food Protection and Defense (NCFPD) trip to China
- **Memorandum of Understanding MOU with NCFPD**
  - Resource sharing
  - Consensus
  - Access to both academic and industry stakeholders
- **Ancillary outreach to sector-specific agencies**
  - U.S. Department of Agriculture (USDA)/Economic Research Service (ERS)
  - USDA/Animal and Plant Health Inspection Service (APHIS)
  - U.S. Food and Drug Administration (FDA)/Center for Food Safety and Applied Nutrition (CFSAN)

Definitions

- **Food Defense - the proactive management of the food supply chain in order to prevent the malevolent introduction of a pathogen or toxin. Food defense is the rational response to what the World Health Organization defines as food terrorism, "an act or threat of deliberate contamination of food for human consumption with chemical, biological, or radioactive agents for the purpose of causing injury or death to civilian populations and/or disrupting social, economic, or political stability."**

- **Food Safety - the proactive management of the food supply chain in order to minimize the occurrence and concentrations of harmful pathogens and toxins that occur naturally in food.**

- **Food Security - access by all people at all times to enough food for an active, healthy life.**

- **Agroterrorism - the deliberate introduction of an animal or plant disease with the goal of generating fear, causing economic losses, and/or undermining stability.**

Incentive

- *"The ruling to kill the Americans and their allies -- civilians and military -- is an individual duty for every Muslim who can do it in any country in which it is possible to do it…"*

  From the second fatwa originally published on February 23, 1998, to declare a holy war, or jihad, against the West and signed by Osama bin Laden, head of Al-Qa'ida, Ayman al-Zawahiri, head of Jihad Group in Egypt, and several other Islamic terrorist groups.

- *"For the life of me, I cannot understand why the terrorists have not attacked our food supply because it is so easy to do."*

  Tommy Thompson, Secretary of Health & Human Services, as quoted in the *New York Times*, December 4, 2004

- *"Deliberate food and water contamination remains the easiest way to distribute chemical or biological agents for the purpose of terrorism…"*

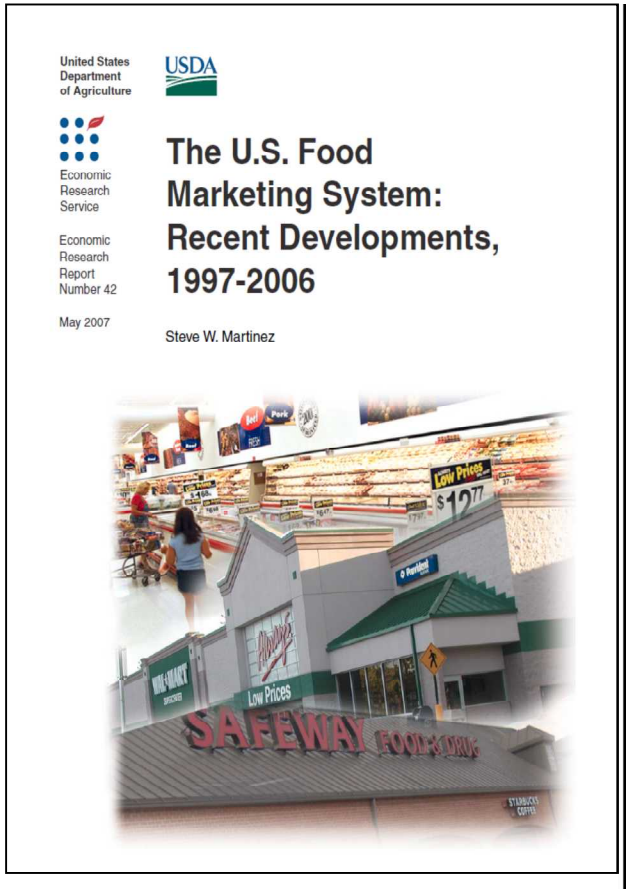
  Khan et al, "Precautions against Biological and Chemical Terrorism Directed at Food and Water Supplies," *Public Health Reports*, January-February 2001,Volume 116

Food Marketing System

- **System of Mass Distribution**

Photo Credit: Steve Eshom, dogcaught

Photo Credit: Reuters Pictures



Total Risk Assessment Methodology

- This Food Defense effort leverages other Sandia investment in risk methodology: the Total Risk Assessment Methodology (TRAM)
- TRAM was presented in a previous talk at the conference
- Threat, vulnerability, and consequence are highly related
- Additional information needs are identified
- Determination of risk is an iterative process

LDRD
LABORATORY DIRECTED RESEARCH & DEVELOPMENT

NNSA
National Nuclear Security Administration

Sandia National Laboratories

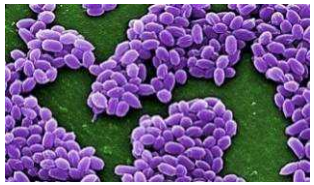
Food & Agriculture Operational Risk Definitions

- ***Risk*** **- the potential for realization of unwanted or adverse consequences. For malevolent events, risk arises from a threat exploiting vulnerability to cause an event with adverse consequences.**
- ***Malevolent Threat*** **- the intention and capability of an adversary to undertake malicious action. In addition, *threat* is partly defined in terms of what has been observed, while vulnerability and consequence are defined in terms of objective world states.**
- ***Vulnerability*** **- the characteristics of the design, implementation, or operation of the key elements of the system that can be exploited by an adversary.**
- ***Consequence*** **- the outcomes of an event, often stated as adverse impacts, that are important to decision makers or society.**

Cross-disciplinary and cross-organizational risk-assessment requires semantic and conceptual consensus, an operational vocabulary, and structured analytical processes and tools.

Identify Area of Concern

As a Function of Agent Attributes, Supply Chain Characteristics, and Objective



Ammunition

Breech

Barrel

Target

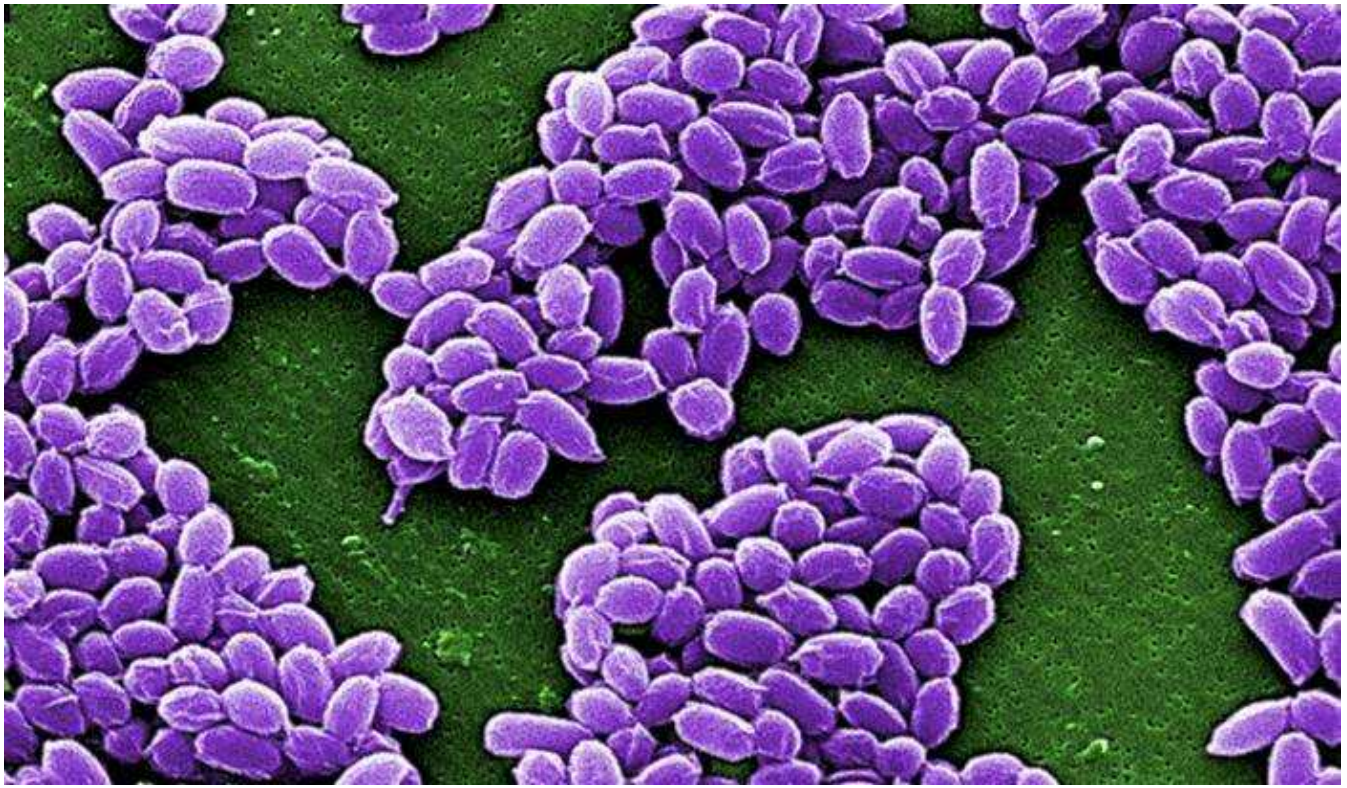
Potential Weapon

Supply Chain Attributes that Contribute to Risk

- Historical precedent
- Speed of distribution and consumption
- Contaminant survives processing and distribution
- Distribution favors broad dissemination
- Imported ingredients
- Employment practices facilitate access
- Potential for high-magnitude human consequences
- Potential for high-magnitude economic consequences
- Vulnerability of transportation modes
- Contaminant detection unlikely

Pathogens and Toxins

- **Suitable pathogens and toxins occur naturally**



Bacillus anthracis spores
Photo credit: Laura Rose, CDC

Pathogen and Toxin Selection Criteria

- **The explicit consideration of all possible toxins, pathogens, and contaminants that could be used in an attack goes beyond the scope of this work.**
- **Five pathogens/toxins were selected for further examination.**
- **Selection criteria for the five that were chosen include:**
  - Lethality
  - Ease of production
  - Pertinent properties
  - Political or fear factor
  - Time to symptoms
  - Historical precedent

Attack Example: The Rajneeshee

- **In 1984, a religious cult, the Rajneeshee, attempted to influence a local election in rural Wasco County, Oregon, by sickening 750 of their neighbors using the salad bars in 10 restaurants as a means of distributing *Salmonella typhimurium*.**

Photo Credit: Scott Bauer, USDA/ARS

Risk Matrix

	PT1	PT2	PT3	PT4	PT5
Necessary Characteristics					
Accessibility of Possible Attack Locations					
Acquisition of Agent					
Lethal Concentration Possible					
Compatible With Distribution?					
Agent Survives Processing?					
Refining Characteristics					
Known Contamination Incidents					
Agent Detected by Normal QA?					
Distribution Topology					
Distribution Consumption Time					
Possible Process Steps for Attack					
Contamination in Foreign location Possible					

Individual Pathogens, Toxins, and Contaminants

Analyst has high degree of confidence that the threat, vulnerability or consequence is **low** given data reviewed to this point

Analyst is uncertain given data reviewed to this point or the threat, vulnerability or consequence is intermediate in value

Analyst has high degree of confidence that the threat, vulnerability or consequence is **high** given data reviewed to this point

Notional Risk Matrix

Photo Credit: Scott Bauer, USDA/ARS

	PT1	PT2	PT3	PT4	PT5
Accessibility of Possible Attack Locations					
Acquisition of Agent					
Lethal Concentration Possible					
Compatible With Distribution?					
Agent Survives Processing?					
Known Contamination Incidents					
Agent Detected by Normal QA?					
Distribution Topology					
Distribution Consumption Time					
Possible Process Steps for Attack					
Contamination in Foreign location Possible					

Conclusions

- **The nation's food supply is vulnerable to attack.**
- **The consequences of an attack would be undesirable.**
- **Actions can be taken to minimize the likelihood of a successful attack.**

Recommendations

- **Identify and track threats to the food supply.**
  - Industry
  - Law enforcement
  - Intelligence agencies
  - State department
- **Identify credible risks for further study and analysis.**
- **Identify mitigation alternatives.**
- **Assess alternatives using models based on insights and data from industry experts.**
- **Evaluate practical tradeoffs between alternatives.**
- **Communicate results to those who can act on them within industry and government.**


NISAC