

# Vulnerability Assessment Tools

---

**David W. K. Acheson, M.D.**

Assistant Commissioner for Food Protection  
U.S. Food and Drug Administration



# Overview

---

- Food Defense
- Vulnerability Assessment Tools
  - Operational Risk Management (ORM)
  - CARVER
- Strategic Partnership Program on Agroterrorism (SPPA)
- The Future



# What is Food Defense?

---

## Food Defense

Protection of food products from *intentional adulteration* by biological, chemical, physical or radiological agents



# What Is Food Defense?

---

## Food Defense

Protection of food products from *intentional adulteration* by biological, chemical, physical or radiological agents

## Food Safety

Protection of food products from *unintentional contamination* by agents



# Why The Food Supply?

---

- Economic, health, societal, psychological, and political significance
- Deliberate contamination could cause:
  - Significant public health consequences
  - Widespread public fear
  - Devastating economic impacts
  - Loss of public confidence in the safety of food and effectiveness of government



# Food Defense Goals

---

- To prevent an attack if possible
- To respond rapidly and efficiently if needed
- To recover rapidly and restore consumer confidence in the food supply



# Food Defense Goals

## *Prevention*

---

### ■ Raise Awareness

- ALERT
- Web-based training

### ■ Understand Vulnerabilities

- Operational Risk Management
- CARVER+Shock
  - Federal only
  - SPPA
  - Software tool

### ■ Implement Mitigation Steps



# Awareness Training

---

## Introduction to Food Security Awareness

- Basic understanding of the risk that intentional contamination presents to food establishments, and what factors affect that risk.
- Encourage food security awareness in the employees and management of food industry establishments.

[http://www.fda.gov/ora/training/orau/FoodSecurity/  
startpage.html](http://www.fda.gov/ora/training/orau/FoodSecurity/startpage.html)



# Awareness Training

---

## Food Defense Awareness

- Webcast discussing Federal actions, as well as the role of States and Locals in food defense
- Introduction of ALERT acronym

<http://www.ConnectLive.com/events/fooddefense>



# A.L.E.R.T

---



**How do I ALERT the operators of the establishments to make them more aware of Food Defense issues?**



# A.L.E.R.T

---

## Five Main Principles

1. What do you know about the foods arriving at your establishment?
2. How do you maintain security in your establishment?
3. What do you know about people with access to your establishment?
4. Do you keep track of food security issues in your establishment?
5. What would you do if you were threatened?




# A.L.E.R.T

In today's world it is important to be  
**ALERT** to protect your business.

- A** How do you **ASSURE** that the supplies and ingredients you use are from safe and secure sources?
- L** How do you **LOOK** after the security of the products and ingredients in your facility?
- E** What do you know about your **EMPLOYEES** and People coming in and out of your facility?
- R** Could you provide **REPORTS** about the security of your products while under your control?
- T** What do you do and whom do you notify if you have a **THREAT** or issue at your facility, including suspicious behavior?

Can you answer these questions?

This message brought to you by the  
U.S. Food and Drug Administration  
U.S. Centers for Disease Control and Prevention  
U.S. Department of Agriculture



For help in answering these questions,  
check [www.cfsan.fda.gov/alert](http://www.cfsan.fda.gov/alert)

An **ALERT** for owners and  
operators of food establishments  
about the security of your facilities ...



<http://www.cfsan.fda.gov/alert>



# Vulnerability Assessment Tools

---

- Operational Risk Management (ORM)
- CARVER



# ORM

---

## Food Assessment Process

- Identify Agents
- Identify Foods
- Identify Food/Agent Scenarios



# ORM

## *Identification of Agents*

---

**Develop list of priority terrorism agents with potential for dissemination via food**

- Started with CDC list
- Modified based on:
  - Stability of agent in food matrix
  - Odor/flavor/color of agent in food matrix
  - Severity of public health outcomes
  - Oral infective/toxic dose
  - Availability of agent
  - Threat intelligence



# ORM

## *Food/Agent Scenarios*

---

**Assess risk for specific product-agent-activity combinations covering harvest, production and delivery (farm to table)**

- Farm/dairy farm/orchard/apiary/fishing vessel
- Bulk transportation
- Manufacturing (including packing houses)
- Finished product transportation
- Warehousing
- Retail/food service



# ORM

## *Evaluated Foods*

---



- Baby Food
- Breaded food
- Canned Food, Low-Acid
- Cereal
- Deli Salad
- Dietary Supplements
- Entrées, Cooked
- Flour
- Fruit Juice
- Gum Arabic (ingredient)
- High Fructose Corn Syrup (ingredient)
- Honey
- Ice Cream
- Infant Formula
- Milk
- Peanut Butter
- Produce
- Seafood, Cooked
- Soft Drinks
- Spices
- Vitamins
- Water, Bottled
- Yogurt



# ORM

## *Assess Level of Risk*

		PROBABILITY				
		Very	High	Medium	Low	Very
SEVERITY	Very High	Higher Risk	Higher Risk	Higher Risk	Higher Risk	Lower Risk
	High	Higher Risk	Higher Risk	Higher Risk	Lower Risk	Lower Risk
	Medium	Higher Risk	Lower Risk	Lower Risk	Lower Risk	Lower Risk
	Low	Lower Risk	Lower Risk	Lower Risk	Lower Risk	Lower Risk
		RISK LEVELS				

 Higher Risk  
 Lower Risk



# ORM

## *Assess Level of Risk*

---

**Overarching factor: Intelligence concerning a threat to a particular food may raise its risk level**

***Higher*** Foods are classified as high risk when one or more, but not all, combinations are higher

***Lower*** Low risk does not mean no risk - attention should be paid to security of all foods



# ORM

## *Attributes of Target*

---

### Common features of higher risk foods

- Large Batches*** – large number of consumers
- Uniform Mixing*** – contaminate all servings in batch
- Short Shelf Life*** – minimal time to identify problem and intervene
- Ease of Access*** – accessible targets are more attractive



# CARVER

---

- Breaks a food system into its smallest pieces (nodes) in the farm to table continuum
- Identifies “critical nodes” that are the most likely targets for terrorist attack, by applying the analysis to each node
- Leads to the identification of countermeasures to reduce the risk at those nodes
- CARVER software tool developed to facilitate assessments



# CARVER + Shock

---

Considers seven factors affecting the desirability of a target

1. **C**riticality      Public health and economic impacts to achieve the attacker's intent
2. **A**ccessibility      Physical access to the target
3. **R**ecuperability      Ability of the system to recover from the attack
4. **V**ulnerability      Ease of accomplishing the attack
5. **E**ffect      Amount of direct loss from an attack
6. **R**ecognizability      Ease of identifying a target
7. **S**hock      Combined physical, public health, psychological, and economic effects of an attack



# CARVER + Shock

---

- Federal assessments
  - Classified
  - Very limited exposure
  
- Limited assessments with specific industries
  - Bottled Water
  
- Strategic Partnership Program on Agroterrorism (SPPA)



# Strategic Partnership Program on Agroterrorism (SPPA)

---

## *What it is*

- A joint initiative of FBI, DHS, FDA and USDA
- Announced July 26, 2005
- Collaborate with private industry and states
- Overall goal is to undertake or validate vulnerability assessments
- Use CARVER + Shock assessment tool



# SPPA

---

## *How it is done*

- Voluntary industry and state partners join the Federal partners to conduct local assessments
- Government works with commodity group trade associations to increase the number of firms conducting the assessment and to generate information based on more than one company
- A site visit is conducted at food and agriculture sites that represent the industry/commodity group
- The actual assessment takes place in a facility conference room or hotel conference room



# SPPA

---

## *Objectives*

- Identify vulnerabilities in the food and agriculture sector
- Identify early indicators and warnings that could signify planning for an attack
- Develop mitigation strategies to reduce the threat/prevent an attack
- Identify research and development (R&D) needs
- Gather information to enhance existing tools that both Government and industry employ
- Develop guidance for Federal, state, local and industry stakeholders



# SPPA

## Criteria List

**Aquaculture production**

**Cattle stockyard/sale barn**

**Beef cattle feedlot**

**Citrus Production**

**Corn farm**

**Dairy farm**

**Poultry farm**

**Rice mill**

**Seed production**

**Soybean farm**

**Swine production**

**Veterinary biologics**

**Deli meat processing**

**Grain elevator/Grain export  
handling facility**

**Ground beef processing**

**Hot dog processing**

**Import facilities**

**Processed poultry**

**Liquid eggs processing**

**School kitchens**

**Retailers – processing meat**

**Warehouses/Distribution  
Center**

**Animal foods/feeds**

**Baby food**

**Deli salads**

**Dietary supplements**

**Flour**

**Frozen entrees**

**Fruit juice**

**Gum arabic**

**High fructose corn syrup**

**Honey**

**Ice cream**

**Infant formula**

**Milk**

**Peanut butter**

**Produce**

**Seafood**

**Soft drinks**

**Spices**

**Vitamins**

**Bottled water**

**Yogurt**

**Stadium Food Service**

**Breakfast cereals**

**Conducted**

**Received or Scheduled**



# SPPA

## *General Industry Vulnerabilities*

---

### *Food Processing*

- Nodes of highest concern for food products were those in which direct human contact with the largest amount of product (large batch sizes) was both possible and likely
- Secondary ingredients are a high concern because they are usually dispersed and mixed into large amounts of product during further processing



# SPPA

## *General Industry Vulnerabilities*

---

### *Agricultural Production*

- Readily available, highly transmissible or contagious plant and animal diseases are the greatest threat from an economic perspective
- A zoonotic disease transmissible between animals and humans, as a threat-agent, raises the possibility for a dual impact to public health and the economy



# SPPA

## *Lessons Learned*

---

- Excellent opportunity for the private sector to educate officials about their operations and to interact with government
- Excellent opportunity for industry to learn from each other
- The downside
  - Significant time commitment
  - Impossible to engage the entire sector
  - Time only permits the exploration of a few agents



# CARVER Software Tool

---

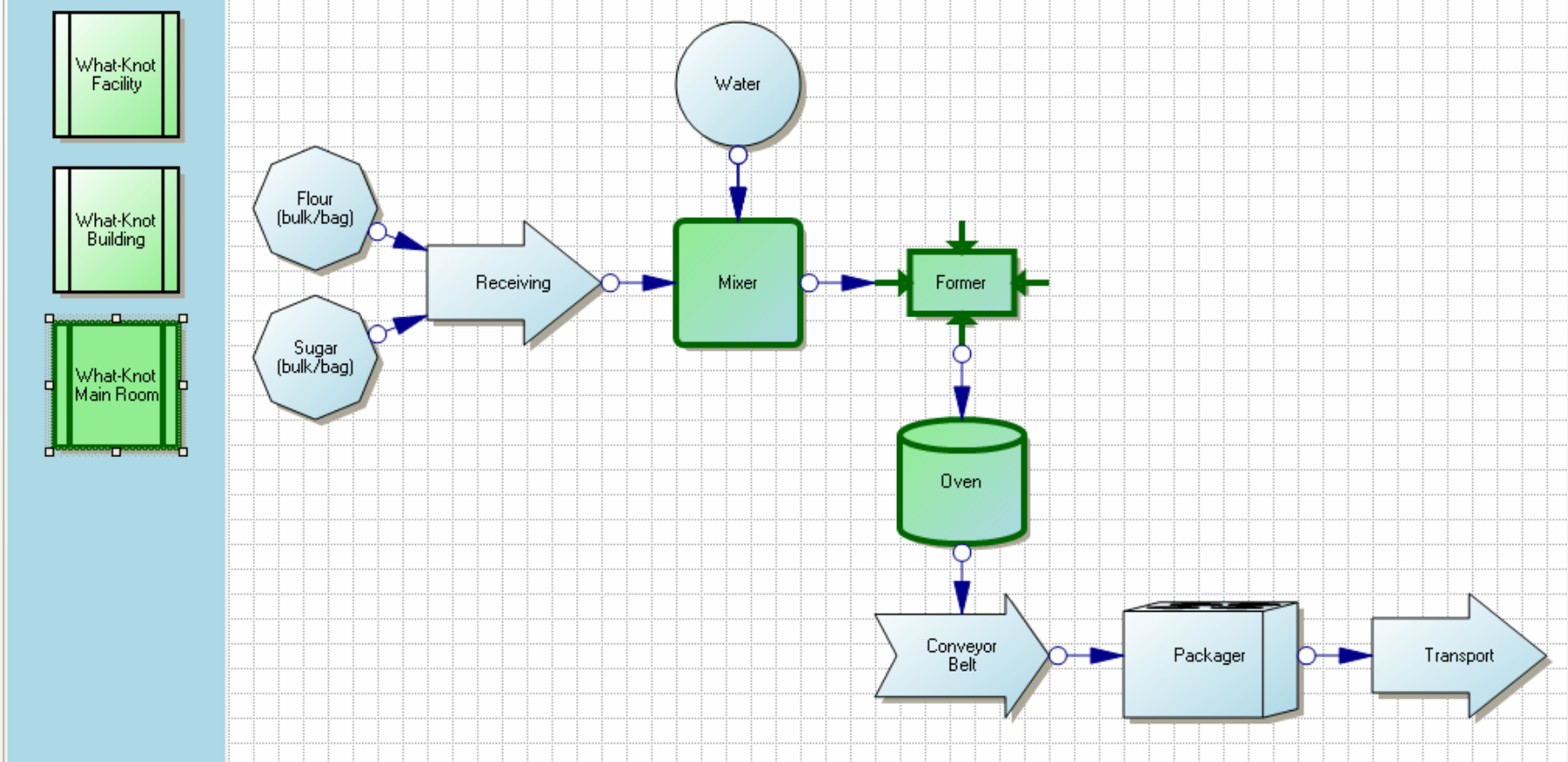
- Assessment process using a software-based system
  - Uses a set of questions
  - Simple menus of options
  - Identifies and ranks vulnerabilities for a country (food supply, food production process or facility)
  - Results based on input of information
  - Customized results available only to the user
- Free and available by download
- Limited availability of CDs
- See [www.cfsan.fda.gov/fooddefense](http://www.cfsan.fda.gov/fooddefense)





# CARVER

+ shock



Icon Category: Processing (147)

Icon Sub-Category: Chilling (8)

Search for Icon:

- Blast Freezer
- Cold Press
- Cooler/Chiller
- Cooling Tunnel
- Freezer
- Hydrocooler
- Other Chilling
- Spray Cooler

# Summary

---

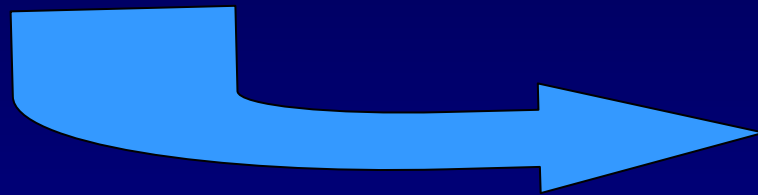
- Continue to focus on risk
  - Direct resources to areas of maximum risk
- Continue to raise awareness
- Identify mitigation strategies
- Ensure the ability to respond is robust
- Develop plans for recovery
- Integrate Food Defense with Food Safety



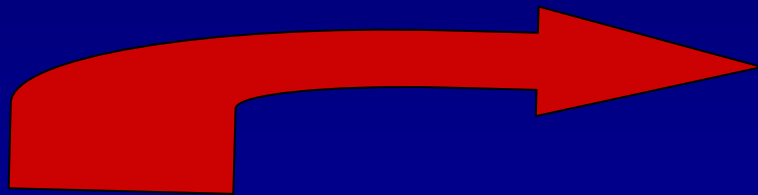
# Food Protection

---

Food Safety



Food Defense



Food Protection

- Awareness
- Risk-based decision making
- Mitigation strategies
- Communication
- Scientific infrastructure
- IT infrastructure

*Prevention – Intervention - Response*



**QUESTIONS ?**

---

