CHARACTERISTICS AND COMMON VULNERABILITIES INFRASTRUCTURE CATEGORY: AGRICULTURAL STORAGE FACILITIES

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Preventing terrorism and reducing the nation's vulnerability to terrorist acts requires an understanding of the common vulnerabilities of critical infrastructures, identifying site-specific vulnerabilities, understanding the types of terrorist activities that likely would be successful in exploiting those vulnerabilities, and taking preemptive and protective actions to mitigate vulnerabilities so that terrorists are no longer able to exploit them. This report characterizes and discusses the common vulnerabilities observed at agricultural storage facilities that store large quantities of raw agricultural input, house live animals at rearing/slaughtering facilities, or store processed foods awaiting transportation and distribution to retail sales locations and restaurants.

AGRICULTURAL STORAGE FACILITIES CHARACTERISTICS

Common Storage Facility Characteristics

Traditionally, food in America is produced through a series of processes commonly referred to as the "farm to table" continuum. This process is comprised of multiple components, including production, distribution, processing, transportation, wholesaling, exporting/importing, retail sales, and consumption. Each component of the "farm to table" continuum is achieved in a variety of ways specific to the particular end product being produced. At multiple stages of these processes, raw agricultural products, farm input supplies, and consumer-ready foods are stored in large facilities. These agricultural storage facilities include facilities storing raw agricultural products (wheat, corn, apples, etc.) prior to processing; farm input supplies (fertilizers, chemicals, etc.), live animals (cattle, swine, chickens, etc.), or processed products ready for distribution and consumption (cheese, cereals, packaged products, etc.). In this regard, there is not a "typical" agricultural storage facility. Rather, a variety of facilities specific to the storage requirements of a given product or component serve the "farm to table" continuum.

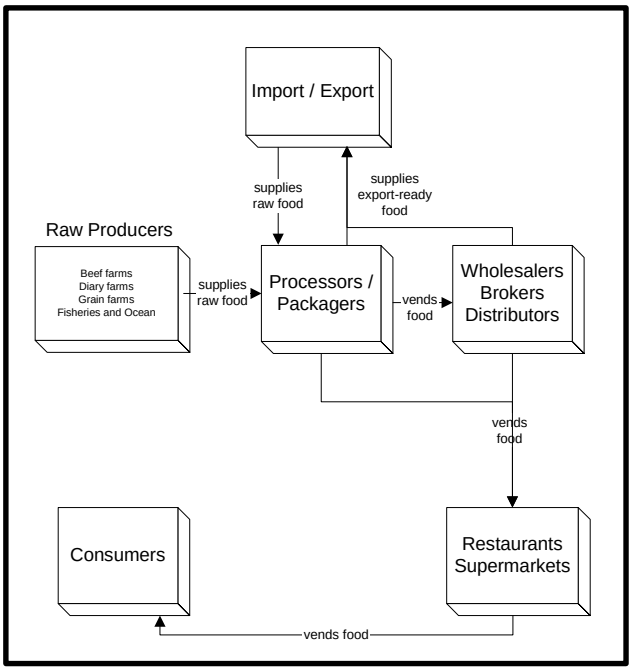

Figure 1 "Farm-to-Table" Continuum

Across the stated continuum, agricultural storage facilities are quite varied.

- Raw agricultural products are stored in facilities designed to receive and house a variety of goods from local producers. The producers send their products to storage facilities located at processing plants or facilities that store raw agricultural products prior to distribution to processing facilities. These facilities are traditionally located near rural farming communities from which their particular products are grown.

- Animal and aquaculture slaughtering and rearing facilities represent another aspect of "agricultural storage" with unique vulnerabilities. Due to efficiencies gained in animal production as well as storage and distribution, specific vulnerabilities surround the dissemination of transmittable diseases and the rapid distribution of contaminated products across the country. Currently, just 2% of America's feedlots produce 78% of United States (U.S.) cattle. Nearly all cattle are processed in four slaughterhouses, and almost all hogs move through four, separate slaughterhouses. Nine farms produce 59% of the country's broiler chickens. Poultry, swine, and beef storage, slaughtering, and distribution efforts are regionally based, and as such, the storage facilities associated with each commodity are regionally located. This particular "storage" vulnerability has massive economic, public health, and public confidence implications, which require multi-jurisdictional preparation, prevention, response, and recovery efforts.

- Storage of processed and packaged goods represent another component of the "farm to table" continuum. In this component, food products are stored in facilities prior to distribution to wholesalers, retailers, restaurants, and consumers. Depending on the scale

of the storage and distribution facility, this component may represent a more regional vulnerability.

Figure 2 Local "On-Farm" Grain Storage

Figure 3 Feedlot

Figure 4 Chicken Ready for Consumer Purchase

Common Components

Common components exist within the wide variety of agricultural storage facilities. Consistent with the breakdown of facilities into storage of raw products, animal slaughtering and rearing facilities, and storage facilities for processed goods, common components exist in each type of facility (see Table 1).

Table 1 Common Components in Various Types of Agricultural Facilities

Raw Product Storage Facility	Animal Slaughter/Rearing Facility	Processed Storage and Distribution Facility
Storage bins	Open feed	Loading docks
Receiving lots	Slaughtering facilities	Large storage areas
Chemicals and fertilizers	Animal bins/pens	Transportation docks
Personnel	Transportation docks	Refrigeration components
	Ventilation components	Specialized containers
	Personnel	Personnel

Standards

Raw products such as meat, poultry, fruits, vegetables, and dairy products are stored in “cold storage” facilities, which are privately owned refrigerated warehouses. Currently, there are no mandatory security guidelines placed on these facilities, and no inspection takes place until the raw product reaches the food processor.

Raw grain is handled in one of two ways, with roughly 50% placed in “on farm” storage, and the remaining 50% in commercial grain bins. Depending on the market, grain may move from the field or farm storage to a county (local) elevator, terminal elevator, or processor. At this point, the grain is checked for quality and segregated according to specific quality parameters. At the present time, the U.S. Department of Agriculture (USDA) has not issued any security guidelines for these facilities.

The Food Safety and Inspection Service (FSIS) of the USDA and the Food and Drug Administration (FDA) have prepared general food storage guidelines for industry. The guidance represents the thinking of these agencies on actions that may minimize the risk of tampering or intentional contamination. They are voluntary guidelines.

FSIS has provided two sets of guidelines:

- *FSIS Security Guidelines for Food Processors* (May 2002). Designed to assist federal- and state-inspected plants that are involved in meat, poultry, and egg production.

- *FSIS Safety and Security Guidelines for the Transportation and Distribution of Meat, Poultry, and Egg Products* (July 2003). Designed to assist small facilities in the shipping and handling of meat, poultry, and egg products.

The guidelines discuss issues such as planning, vulnerability assessment, development and implementation of procedures, emergency operations, training and testing, employee screening and education, physical security, and operational security. However, these facilities are not bound to incorporate this guidance into existing security plans and may also utilize guidelines from other government and private sector organizations and agencies.

FDA has provided the following guidance documents for industry:

- *Importers and Filers: Food Security Preventive Measures Guidance* (March 21, 2003);

- *Food Producers, Processors, and Transporters: Food Security Preventive Measures Guidance* (March 2003);

- *Retail Food Stores and Food Service Establishments: Food Security Preventive Measures Guidance* (Draft: March 2003).

The FDA documents identify preventive measures that food establishments can use to minimize the risk of malicious, criminal, or terrorist actions. The above documents are also not mandatory and offer guidelines for potential security violations stemming from activities related to management, human element (employee and public), physical security, storage, and operations.

Implications

In lieu of specific guidelines or mandatory regulation, food storage facilities will implement those security features that are most economically feasible. Additionally, a “one size fits all” approach to developing policies and procedures for securing agricultural storage facilities is not ideal. Certain facilities, based on the type of product being stored, the local environment, and available intelligence and threat assessments, will not require the same controls as other, higher-risk facilities.

While awareness of security issues and the implementation of security measures at facilities that store food is an important step, there is also a pressing need for entities along the entire food production value network to participate in an integrated information/communication system for food security. The optimal approach involves reinforcing food safety and security across the food chain and documenting the diligence and implementation of food security activities, including those at storage facilities. As warranted by the Bioterrorism Act of 2002, data will be available to populate such information-sharing systems.

CONSEQUENCE OF EVENT

The consequences associated with an attack on an agricultural storage facility or a series of coordinated attacks across multiple facilities would depend on the type of event(s), the location of the event and the type of facility involved. Particular consequences can only be estimated or inferred from historical events.

Traditionally, much of the emphasis for food-borne contamination has been focused on the actual food production processes and processing facilities. Traditional food safety practices and the inspection of these practices by the FDA and the USDA mainly occur at food processing facilities. In addition to the inspection of processing facilities, industry focuses its resources on testing for and diagnosis of particular pathogens and toxins in the food processing process. Food storage facilities have received comparatively little consideration from a food security perspective.

Estimating the consequence of a deliberate contamination of or an attack on an agricultural storage facility depends on the downstream impact of the consumption and distribution of the products stored at a particular location. There is, of course, a local impact associated with the destruction of a particular facility.

Historical cases can illustrate the quick and far-reaching potential of this type of event. In 1984, members of a religious cult in Dalles, Oregon, contaminated salad bars with salmonella serotype typhimurium. Though the attack was locally contained, 751 people became ill, and the surrounding medical resources were strained beyond their normal capacity. In addition, the event spread fear throughout the U.S. and temporarily impacted the revenues normally generated at these types of eating establishments.

Recent outbreaks of Bovine Spongiform Encephalopathy (BSE) and Foot and Mouth Disease (FMD) in Britain in 1994 and 2001, respectively, provide some perspective on the human and economic impacts of contagious diseases spread through the cattle population. Bear in mind that the spread of such diseases can take place at storage facilities where there is an increased risk of infection spreading. It is not, however, safe to assume that the spread and impact of diseases and biological agents are directly linked to vulnerabilities at agricultural storage facilities. During the 1994 BSE outbreak, Britain experienced a 40% drop in cattle sales and a 26% drop in domestic household consumption of beef and veal. In the 2001 FMD outbreak, more than $63 million was paid in indemnities to farmers for the slaughter and quarantine of infected cattle. Additionally, the estimated cost to the British economy was between $3.6 billion and $11.6 billion (U.S. dollars) for FMD and roughly $5.8 billion (U.S. dollars) for BSE. These costs constitute

roughly 0.3% to 0.8% of the British gross national product. These numbers become more indicative of both the economic and public confidence consequences associated with food safety and security when one considers that roughly 140 humans worldwide became infected with associated diseases during the outbreaks.

The impact of a major attack on the U.S. food supply could be very large in terms of public health and economic impact. Some experts estimate that no large U.S. city has more than a seven-day supply of food available at any one time, and an attack to the system would cause severe disruption almost instantly. In general, the structure of the agricultural sector is vertical in nature. A small number of large processing and storage facilities control the majority of production and warehousing, making the potential for a widespread stream of impact more likely. Consumer confidence in the government's ability to protect the food supply would be impacted, causing fear and potential panic.

COMMON VULNERABILITIES

Critical infrastructures and key assets vary in many characteristics and practices relevant to specifying vulnerabilities. There is no universal list of vulnerabilities that applies to all assets of a particular type within an infrastructure category. Instead, a list of common vulnerabilities has been prepared, based on experience and observation. These vulnerabilities should be interpreted as possible vulnerabilities and not as applying to each and every individual facility or asset.

Exhibit 1 Economic and Institutional Vulnerabilities	
Economic and institutional vulnerabilities are those that would have extensive national, regional, and industry-wide consequences if exploited by a terrorist attack.	
1	Deliberate or accidental contamination of food may have enormous economic implications in the U.S., where one out of every eight Americans is estimated to work in an occupation directly linked to food production. In fact, food terrorists may have economic disruption as their primary motive for attack of this infrastructure.
2	At least three types of economic effects may result from an act of food terrorism: Direct economic losses attributable to the costs of responding to the incident, indirect multiplier effects from compensation paid to affected producers and the losses suffered by affiliated industries, such as suppliers, transporters, distributors, and restaurant chains; and international costs in the form of trade embargoes imposed by trading partners.

Exhibit 2 Site-Related Vulnerabilities

Site-related vulnerabilities are conditions or situations existing at a particular site or facility that could be exploited by a terrorist or terrorist group to do economic, physical, or bodily harm or to disable or disrupt facility operations or other critical infrastructures.

Raw Agricultural Product Storage/Storage at Distribution Centers	
1	Facilities receive products around the clock.
2	Delivered products may be left unattended once received.
3	A strong element of trust exists in farming communities.
4	Large populations of migrant workers may be associated with raw agricultural production and storage.
5	Chemicals and fertilizers are used/stored in production and storage facilities.
6	Physical security measures may not be implemented (e.g., security patrols or video surveillance).
7	Critical assets may be set close to the perimeter fence.
8	Barriers or other hardening equipment may not protect gates and critical assets near the perimeter fence line.
9	Doors, windows, roof openings/hatches, vent openings, ventilation systems, utility rooms, ice manufacturing and storage rooms, loft areas, trailer bodies, tanker trucks, railcars, bulk storage tanks, etc. may not be secured or may be left unattended when not in use.
10	Access identification may not be required or may be inadequately enforced.
11	There may be multiple entrances to restricted areas.
12	Equipment such as bulk unloading equipment (augers, pipes, conveyer belts, and hoses) may not be secured when not in use and may not be inspected before use.
13	A secure accounting system for access keys may not be in place.
14	There may be a number of obscure places available to temporarily conceal contaminants.
15	Interior and exterior lighting may be insufficient in certain parts of the facility (e.g., too little, poorly spaced, or improperly directed).
16	There may be no system in place to monitor vehicles parked on the premises. Potential measures could include placards, decals, key cards, locks, and passes.
17	Parking areas may be in close proximity to processing or storage facilities.
18	Facilities may use unskilled and transient personnel, and turnover rates may be high.
19	The potential exists for cross-contamination of food products in shipping.
20	An adequate system may not be in place for investigating missing or extra stock outside the normal acceptable variances.
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Site-related vulnerabilities are conditions or situations existing at a particular site or facility that could be exploited by a terrorist or terrorist group to do economic, physical, or bodily harm or to disable or disrupt facility operations or other critical infrastructures.	
21	Adequate controls may not be exercised over the storage and destruction of product labels.
22	Containers, packages, and cartons may be reused many times.
23	Random inspections of facilities and vehicles may be inadequate.
24	Finished product testing to detect signs of tampering or other suspicious activity may be inadequate.
25	Sufficient practices may not be in place to ensure appropriate locks or seals with accompanying documentation on vehicles, containers, or railcars.
26	There may be no system in place to verify the location of a shipment at any time.
27	There may be no security policy in place that establishes scheduled deliveries and refusal of unscheduled deliveries.
28	Inventory control may be inadequate.
29	There may be no training or insufficient training to alert the staff to counterfeit product.
30	Security responsibilities may not be assigned to specific person(s) at facilities, to develop policies and procedures, socialize security practices with employees, and periodically conduct testing and review.
Animal Storage (Feed and Slaughter)	
31	Close conditions provide the opportunity for fast transmission of diseases and toxins.
32	Concentrated and intensive nature of animal storage and slaughter facilities may hasten the spread of disease.
33	Facilities may use unskilled and transient personnel, and turnover rates may be high.
34	There may be insufficient security and surveillance.
35	Passive, slow disease surveillance and reporting system may impact the rate of spread and detection.
36	Insufficient veterinarian training could impact the rate of disease diagnosis and/or treatment.
37	Increased susceptibility of livestock to disease could facilitate the spread of the disease.
38	Small or nonexistent stockpiles of vaccines for foreign animal diseases could impact the incidence of infection and rate of spread.
39	Low-level screening of animal feed for ruminant byproducts could introduce contaminants into the livestock population.
40	Security responsibilities may not be assigned to specific person(s) at facilities, to develop policies and procedures, socialize security practices with employees, and periodically conduct testing and review.

Exhibit 3 Interdependent Vulnerabilities

Interdependency is the relationship between two or more infrastructures by which the condition or functionality of each infrastructure is affected by the condition or functionality of the other. Interdependencies can be physical, geographic, logical, or information-based.

Water	
1	Water is used across the farm to table continuum from irrigation in raw production through processing.
2	The affect of agricultural production on the water supply through pesticide run off, irrigation demands, and the environmental impact of animal production (slaughter and storage facilities) is also an interdependency.
Electric Power	
1	Storage of processed foods can require refrigeration and electric power. Loss of electric power and temperature control increases likelihood of product contamination.
Transportation	
1	Agricultural storage depends on transportation for the distribution of produced, stored, and processed goods.
Government Services	
1	Agricultural production and storage are heavily regulated and inspected by a variety of federal, state, and local government entities.
Public Health Services	
1	Food-borne pathogens contribute to public health issues and human illness. The ability of the public health community and the agriculture communities to collaborate on outbreaks and epidemiological issues is an imperative for combating food-borne illness. The ability to identify food-borne pathogens and conduct successful traces back to processing and storage facilities and raw producers will greatly enhance disease control capability.
Border and Transportation Security	
1	Inspection of imported food products prior to domestic storage is a key element of the nation's food safety and security effort. Contamination of food products with uninspected, foreign-produced products at any element of storage is a major risk factor (especially prior to processing where cross-contamination can occur).

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