The Burger That Shattered Her Life
Trail of E. Coli Shows Flaws in Ground Beef Inspection System

By MICHAEL MOSS

Stephanie Smith, a children’s dance instructor, thought she had a stomach virus. The aches and cramping were tolerable that first day, and she finished her classes.

Then her diarrhea turned bloody. Her kidneys shut down. Seizures knocked her unconscious. The convulsions grew so relentless that doctors had to put her in a coma for nine weeks. When she emerged, she could no longer walk. The affliction had ravaged her nervous system and left her paralyzed.

Ms. Smith, 22, was found to have a severe form of food-borne illness caused by E. coli, which Minnesota officials traced to the hamburger that her mother had grilled for their Sunday dinner in early fall 2007.

“I ask myself every day, ‘Why me?’ and ‘Why from a hamburger?’” Ms. Smith said. In the simplest terms, she ran out of luck in a food-safety game of chance whose rules and risks are not widely known.

Meat companies and grocers have been barred from selling ground beef tainted by the virulent strain of E. coli known as O157:H7 since 1994, after an outbreak at Jack in the Box restaurants left four children dead. Yet tens of thousands of people are still sickened annually by this pathogen, federal health officials estimate, with hamburger being the biggest culprit. Ground beef has been blamed for 16 outbreaks in the last three years alone, including the one that left Ms. Smith paralyzed from the waist down. This summer, contamination led to the recall of beef from nearly 3,000 grocers in 41 states.

Ms. Smith’s reaction to the virulent strain of E. coli was extreme, but tracing the story of her burger, through interviews and government and corporate records obtained by The New York Times, shows why eating ground beef is still a gamble. Neither the system meant to make the meat safe, nor the meat itself, is what consumers have been led to believe.

Ground beef is usually not simply a chunk of meat run through a grinder. Instead, records and interviews show, a single portion of hamburger meat is often an

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amalgam of various grades of meat from different parts of cows and even from different slaughterhouses. These cuts of meat are particularly vulnerable to E. coli contamination, food experts and officials say. Despite this, there is no federal requirement for grinders to test their ingredients for the pathogen.

The frozen hamburgers that the Smiths ate, which were made by the food giant Cargill, were labeled “American Chef’s Selection Angus Beef Patties.” Yet confidential grinding logs and other Cargill records show that the hamburgers were made from a mix of slaughterhouse trimmings and a mash-like product derived from scraps that were ground together at a plant in Wisconsin. The ingredients came from slaughterhouses in Nebraska, Texas and Uruguay, and from a South Dakota company that processes fatty trimmings and treats them with ammonia to kill bacteria.

Using a combination of sources — a practice followed by most large producers of fresh and packaged hamburger — allowed Cargill to spend about 25 percent less than it would have for cuts of whole meat.

Those low-grade ingredients are cut from areas of the cow that are more likely to have had contact with feces, which carries E. coli, industry research shows. Yet Cargill, like most meat companies, relies on its suppliers to check for the bacteria and does its own testing only after the ingredients are ground together. The United States Department of Agriculture, which allows grinders to devise their own safety plans, has encouraged them to test ingredients first as a way of increasing the chance of finding contamination.

Unwritten agreements between some companies appear to stand in the way of ingredient testing. Many big slaughterhouses will sell only to grinders who agree not to test their shipments for E. coli, according to officials at two large grinding companies. Slaughterhouses fear that one grader’s discovery of E. coli will set off a recall of ingredients.

Two current employees said the flow of carcasses moves into the meat-cutting side of the slaughterhouse, where workers said they could keep up with the flow unless they spot any remaining feces.

“Consulting with suppliers is the first step in the process,” said Dr. Jeffrey Bender, a food safety expert at the University of Minnesota who helped develop systems for tracing E. coli contamination. He said that while outbreaks had been on the decline, “unfortunately it looks like we are going a bit in the opposite direction.”

Food scientists have registered increasing concern about the virulence of this pathogen since only a few stray cells can make someone sick, and they warn that federal guidance to cook meat thoroughly and to wash up afterward is not sufficient. A test by The Times found that the safe handling instructions are not enough to prevent the bacteria from spreading in the kitchen.

Cargill, whose $116.6 billion in revenues last year made it the country’s largest private company, declined requests to interview company officials or visit its facilities. “Cargill is not in a position to answer your specific questions, other than to state that we are committed to continuous improvement in the area of food safety,” the company said, citing continuing litigation.

The meat industry treats much of its practices and the ingredients in ground beef as trade secrets. While the Department of Agriculture has inspectors posted in plants and has access to production records, it also guards those secrets. Federal records released by the department through the Freedom of Information Act blacked out details of Cargill’s grinding operation that could be learned only through copies of the documents obtained from other sources. Those documents illustrate the restrained approach to enforcement by a department whose missions include ensuring meat safety and promoting agriculture markets.

Within weeks of the Cargill outbreak in 2007, U.S.D.A. officials swept across the country, conducting spot checks at 224 meat plants to assess their efforts to combat E. coli. Although inspectors had been monitoring these plants all along, officials found serious problems at 55 that were failing to follow their own safety plans.

“Every time we look, we find out that things are not what we hoped they would be,” said Loren D. Lange, an executive associate in the Agriculture Department’s food safety division.

In the weeks before Ms. Smith’s patty was made, federal inspectors had repeatedly found that Cargill was violating its own safety procedures in handling ground beef, but they imposed no fines or sanctions, records show. After the outbreak, the department threatened to withhold the seal of approval that declares “U.S. Inspected and Passed by the Department of Agriculture.”

In the end, though, the agency accepted Cargill’s proposal to increase its scrutiny of suppliers. That agreement came early last year after contentious negotiations, records show. When Cargill defended its safety system and initially resisted making some changes, an agency official wrote back: “How is food safety not the ultimate issue?”

The Risk

On Aug. 16, 2007, the day Ms. Smith’s hamburger was made, the No. 3 grinder at the Cargill plant in Butler, Wis., started up at 6:50 a.m. The largest ingredient was beef trimmings known as “50/50” — half fat, half meat — that cost about 80 cents a pound, making them the cheapest component.

Cargill bought these trimmings — fatty edges sliced from better cuts of meat — from Greater Omaha Packing, where some 2,600 cattle are slaughtered daily and processed in a plant the size of four football fields.

As with other slaughterhouses, the potential for contamination is present every step of the way, according to workers and federal inspectors. The cattle often arrive with smears of feedlot feces that harbor the E. coli pathogen, and the hide must be removed carefully to keep it off the meat. This is especially critical for trimmings sliced from the outer surface of the carcasses.

Federal inspectors based at the plant are supposed to monitor the hide removal, but much can go wrong. Workers slicing away the hide can inadvertently contaminate the meat, and large clamps that hold the hide during processing sometimes slip and smear the meat with feces, the workers and inspectors say.

Greater Omaha vacuums and washes carcasses with hot water and lactic acid before sending them to the cutting floor. But these safeguards are not foolproof.

“As the trimmings are going down the processing line into combiners or boxes, no one is inspecting every single piece,” said one federal inspector who monitored Greater Omaha and requested anonymity because he was not authorized to speak publicly.

The E. coli risk is also present at the gutting station, where intestines are removed, the inspector said.

Every five seconds or so, half of a carcass moves into the meat-cutting side of the slaughterhouse, where workers said they could keep up with the flow unless they spot any remaining feces.

“We would step in and stop the line, and do whatever you do to take it off,” said Esley Adams, a former supervisor who said he was fired this summer after 16 years following a dispute over sick leave. “But that doesn’t mean everything was caught.”

Two current employees said the flow of carcasses keeps up its torrid pace even when trimmers get reassigned, which increases pressure on workers. To protest one such episode, the employees said, dozens of workers walked off the job for a few hours earlier this year. Last year, workers sued Greater Omaha, alleging that they were not paid for the time they need to clean contaminants off their knives and other gear before and after their shifts. The company is contesting the lawsuit.

Greater Omaha did not respond to repeated requests to interview company officials. In a statement, a company official said Greater Omaha had a “reputation for embracing new food safety technology and utilizing science to make the safest product possible.”

Gabe Johnson contributed reporting.
**The Trimmings**

In making hamburger meat, grinders aim for a specific fat content — 26.6 percent for Smith’s patty, 50/50 per cent for Greater Omaha’s, 60/40 for Cargill's grinding operation. To test ingredients before processing, Cargill adds leaner material from three other suppliers.

Records show that some came from a Texas slaughterhouse, Lone Star Beef Processors, which specializes in dairy cows and bulls too old to be fattened in feedlots. In a form letter dated two days before Ms. Smith’s patty was made, Lone Star recounted for Cargill its various safety measures as concluded by federal inspectors. The company said Esley Adams, a former supervisor, that the treatment was effective and safe. And Cargill told that the pathogen was present in the meat, and Cargill watched for some unwanted elements.

Ms. Smith’s burger also contained trimmings from a slaughterhouse in Uruguay, where government officials insist that they have never found E. coli O157:H7 in meat. Yet audits of Uruguay’s meat operations conducted by the U.S.D.A. have found sanitation problems, including improper testing for the pathogen. Dr. Hector J. Lazaneo, a meat safety official in Uruguay, said the problem was corrected immediately. “Everything is fine, finally,” he said. “That is the reason we are exporting.”

Cargill’s final source was a supplier that turns fatty trimmings into what it calls “fine lean textured beef.” The company, Beef Products Inc., said it bought meat that averages between 50 percent and 70 percent fat, including “any small pieces of fat derived from the normal breakdown of the beef carcass.” It warms the trimmings, removes the fat in a centrifuge and treats the remaining product with ammonia to kill E. coli.

With seven million pounds produced each week, the company’s product is widely used in hamburger meat sold by groceries and fast-food restaurants and in the federal school lunch program. Ten percent of Ms. Smith’s burger came from Beef Products, which charged Cargill about $1.20 per pound, or 20 cents less than the lean trimmings in the burger, billing records show.

An Iowa State University study financed by Beef Products found that ammonia reduces E. coli to levels that cannot be detected. The Department of Agriculture accepted the research as proof that the treatment was effective and safe. And Cargill told the agency after the outbreak that it had ruled out Beef Products as the possible source of contamination.

But federal school lunch officials found E. coli in Beef Products material in 2006 and 2008 and again in August, and stopped it from going to schools, according to Agriculture Department records and interviews. A Beef Products official, Richard Jochum, said that last year’s contamination stemmed from a “minor change in our process,” which the company adjusted. The company did not respond to questions about the latest findings.

In combining the ingredients, Cargill was following a common industry practice of mixing trim from various suppliers to hit the desired fat content for the least money, industry officials said.

In all, the ingredients for Ms. Smith’s burger cost Cargill about $1 a pound, company records show, or about 30 cents less than industry experts say it would cost for ground beef made from whole cuts of meat.

Ground beef sold by most grocers is made from a blend of ingredients, industry officials said. Agriculture Department regulations allow hamburger meat labeled ground chuck or sirloin to contain trimmings from those parts of the cow. At a chain like Publix Super Markets, customers who want hamburger made from whole cuts of meat have to buy a steak and have it specially ground, said a Publix spokeswoman, Maria Brous, or buy a product like Bubba Burgers, which boasts on its labeling, “100% whole muscle means no trimmings.”

To finish off the Smiths’ ground beef, Cargill added bread crumbs and spices, fashioned it into patties, froze them and packed them 18 to a carton.

The listed ingredients revealed little of how the meat was made. There was just one meat product listed: “Beef.”

**Tension Over Testing**

As it fed ingredients into its grinders, Cargill watched for some unwanted elements. Using metal detectors, workers snagged stray nails and metal hooks that could damage the grinders, then warned suppliers to make sure it did not happen again.

But when it came to E. coli O157:H7,
Cargill did not screen the ingredients and only tested once the grinding was done. The potential pitfall of this practice surfaced just weeks before Ms. Smith's patty was made. A company spot check in May 2007 found E. coli in finished hamburger, which Cargill disclosed to investigators in the wake of the October outbreak. But Cargill told them it could not determine which supplier had shipped the tainted meat since the ingredients had already been mixed together.

"Our finished ground products typically contain raw materials from numerous suppliers," Dr. Angela Siemens, the technical services vice president for Cargill's meat division, wrote to the U.S.D.A. "Consequently, it is not possible to implicate a specific supplier without first observing a pattern of potential contamination."

Testing has been a point of contention since the 1994 ban on selling ground beef contaminated with E. coli O157:H7 was imposed. The department moved to require some bacterial testing of ground beef, but the industry argued that the cost would unfairly burden small producers, industry officials said. The Agriculture Department opted to carry out its own tests for E. coli, but it acknowledges that its 15,000 spot checks a year at thousands of meat plants and groceries nationwide is not meant to be comprehensive. Many slaughterhouses and processors have voluntarily adopted testing regimes, yet they vary greatly in scope from plant to plant.

The retail giant Costco is one of the few big producers that tests trimmings for E. coli before grinding, a practice it adopted after a New York woman was sickened in 1998 by its hamburger meat, prompting a recall. Craig Wilson, Costco's food safety director, said the company decided it could not rely on its suppliers alone. "It's incumbent upon us," he said. "If you say, 'Craig, this is what we've done,' I should be able to go, 'Cool, I believe you.' But I'm going to check."

Costco said it had found E. coli in foreign and domestic beef trimmings and pressured suppliers to fix the problem. But even Costco, with its huge buying power, said it had met resistance from some big slaughterhouses. "Tyson will not supply us," Mr. Wilson said. "They don't want us to test."

A Tyson spokesman, Gary Mickelson, would not respond to Costco's accusation, but said, "We do not and cannot prohibit grinders from testing ingredients. He added that since Tyson tests samples of its trimmings, "we don't believe secondary testing by grinders is a necessity."

The food safety officer at American Foodservice, which grinds 365 million pounds of hamburger a year, said it stopped testing trimmings a decade ago because of resistance from slaughterhouses. "They would not sell to us," said Timothy P. Biela, the officer. "If I test and it's positive, I put them in a regulatory situation. One, I have to tell the government, and two, the government will trace it back to them. So we don't do that."

The surge in outbreaks since 2007 has led to finger-pointing within the industry. Dennis R. Johnson, a lobbyist for the largest meat processors, has said that not all slaughterhouses are looking hard enough for contamination. He told U.S.D.A. officials last fall that those with aggressive testing programs typically find E. coli in as much as 1 percent to 2 percent of their trimmings, yet some slaughterhouses implicated in outbreaks had failed to find any.

At the same time, the meat processing industry has resisted taking the onus on itself. An Agriculture Department survey of more than 2,000 plants taken after the Cargill outbreak showed that half of the grinders did not test their finished ground beef for E. coli; only 6 percent said they tested incoming ingredients at least four times a year.

In October 2007, the agency issued a notice recommending that processors in at least a few tests a year to verify the testing done by slaughterhouses. But after resistance from the industry, the department allowed suppliers to run the verification checks on their own operations.

In August 2008, the U.S.D.A. issued a draft guideline again urging, but not ordering, processors to test ingredients before grinding. "Optimally, every production lot should be sampled and tested before leaving the supplier and again before use at the receiver," the draft guideline said.

But the department received critical comments on the guideline, which has not been made official. Industry officials said that the cost of testing could unfairly burden small processors and that slaughterhouses already test. In an October 2008 letter to the department, the American Association of Meat Processors said the proposed guideline departed from U.S.D.A.'s strategy of allowing companies to devise their own safety programs, "thus returning to more of the agency's 'command and control' mind-set."

Dr. Kenneth Petersen, an assistant administrator with the department's Food Safety and Inspection Service, said that the department could mandate testing, but that it needed to consider the impact on companies as well as consumers. "I have to look at the entire industry, not just what is best for public health," Dr. Petersen said.

**Tracing the Illness**

The Smiths were slow to suspect the hamburger. Ms. Smith ate a mostly vegetarian diet, and when she grew increasingly ill, her mother, Sharon, thought the cause might be spinach, which had been tied to a recent E. coli outbreak.

Five days after the family's Sunday dinner, Ms. Smith was admitted to St. Cloud Hospital in excruciating pain. "I've had women tell me that E. coli is more painful than childbirth," said Dr. Phillip I. Tarr, a pathogen expert at Washington University in St. Louis.

The vast majority of E. coli illnesses resolve themselves without complications, according to the Centers for Disease Control and Prevention. Five percent to 10 percent develop into a condition called hemolytic uremic syndrome, which can affect kidney function. While most patients recover, in the worst cases, like Ms. Smith's, the toxin in E. coli O157:H7 penetrates the colon wall, damaging blood vessels and causing clots that can lead to seizures.

To control Ms. Smith's seizures, doctors put her in a coma and flew her to the Mayo Clinic, where doctors worked to save her.

"They didn't even think her brain would work because of the seizing," her mother said. "Thanksgiving Day, I was sitting there holding her hand when a group of doctors came in, and one looked at me and just walked away, with nothing good to say. And I said, 'Oh my God, maybe this is my last Thanksgiving with her,' and I stayed and prayed."

Ms. Smith's illness was linked to the hamburger only by chance. Her aunt still had some of the frozen patties, and state health officials found that they were contaminated with a powerful strain of E. coli that was genetically identical to the pathogen that had sickened other Minnesotaans.

Dr. Kirk Smith, who runs the state's food-borne illness outbreak group and is not related to Ms. Smith, was quick to finger the source. A 4-year-old had fallen ill three weeks earlier, followed by her year-old brother and two more children, state records show. Like Ms. Smith, the others had eaten Cargill patties bought at Sam's Club, a division of Wal-Mart.

Moreover, the state officials discovered that the hamburgers were made on the same day, Aug. 16, 2007, shortly before noon. The time stamp on the Smiths' box of patties was 11:58.

On Friday, Oct. 5, 2007, a Minnesota Health Department warning led local news broadcasts. "We didn't want people grilling these things over the weekend," Dr. Smith said. "I'm positive we prevented illnesses. People sent us dozens of cartons with patties left. It was pretty contaminated stuff."

Eventually, health officials tied 11 cases of illness in Minnesota to the Cargill outbreak, and altogether, federal health officials estimate that the outbreak sickened 940 people. Four of the 11 Minnesota victims developed hemo-
lytic uremic syndrome — an usually high rate of serious complications.

In the wake of the outbreak, the U.S.D.A. reminded consumers on its Web site that hamburgers had to be cooked to 160 degrees to be sure any E. coli is killed and urged them to use a thermometer to check the temperature. The other big slaughters, including Tyson, said they were adopting after a New York woman was found to have strains of E. coli before grinding, a practice it said it would work because of the seizing,

Craig Wilson, food safety director for Costco, one of the few big producers that tests for E. coli before grinding. "It's incumbent upon us," he said. "We do not and cannot believe secondary testing by grinders is a guideline said.

The retail giant Costco is one of the following companies to devise their own testing, but said, "We do not and cannot resolve themselves without complications," Dr. Marsden said.

With help from his laboratories, The Times prepared three pounds of ground beef dosed with a strain of E. coli that is nonharmful but acts in many ways like O157:H7. Although the safety instructions on the package were followed, E. coli remained on the cutting board even after it was washed with soap. A towel picked up large amounts of bacteria from the meat.

Dr. James Marsden, a meat safety expert at Kansas State University and senior science adviser for the National American Meat Processors Association, said the Department of Agriculture needed to issue better guidance on avoiding cross-contamination, like urging people to use bleach to sterilize cutting boards. "Even if you are a scientist, much less a housewife with a child, it's very difficult," Dr. Marsden said.

Told of The Times's test, Jerold R. Mande, the deputy under secretary for food safety at the U.S.D.A., said he planned to "look very carefully at the labels that we oversee."

"They need to provide the right information to people," Mr. Mande said, "in a way that is readable and actionable."

Dead Ends

With Ms. Smith lying comatose in the hospital and others ill around the country, Cargill announced on Oct. 6, 2007, that it was recalling 844,812 pounds of patties. The mix of ingredients in the burgers made it almost impossible for either federal officials or Cargill to trace the contamination to a specific slaughterhouse. Yet after the outbreak, Cargill had new incentives to find out which supplier had sent the tainted meat.

Cargill got hit by multimillion-dollar claims from people who got sick.

Shawn K. Stevens, a lawyer in Milwaukee working for Cargill, began investigating. Sifting through state health department records from around the nation, Mr. Stevens found the case of a young girl in Hawaii stricken with the same E. coli found in the Cargill patties. But instead of a Cargill burger, she had eaten raw minced beef at a Japanese restaurant that Mr. Stevens said he traced through a distributor to Greater Omaha.

"Potentially, it could let Cargill shift all the responsibility," Mr. Stevens said. In March, he sent his findings to William Marler, a lawyer in Seattle who specializes in food-borne disease cases and is handling the claims against Cargill.

"Most of the time, in these outbreaks, it's not unusual when I point the finger at somebody, they try to point the finger at somebody else," Mr. Marler said. But he said Mr. Stevens's finding "doesn't rise to the level of proof that I need" to sue Greater Omaha.

It is unclear whether Cargill presented the Hawaii findings to Greater Omaha, since neither company would comment on the matter. In December 2007, in a move that Greater Omaha said was unrelated to the outbreak, the slaughterhouse informed Cargill that it had taken 16 "corrective actions" to better protect consumers from E. coli "as we strive to live up to the performance standards required in the continuation of supplier relationship with Cargill."

Those changes included better monitoring of the production line, more robust testing for E. coli, intensified plant sanitation and added employee training.

The U.S.D.A. efforts to find the ultimate source of the contamination went nowhere. Officials examined production records of Cargill's three domestic suppliers, but they yielded no clues. The Agriculture Department contacted Uruguayan officials, who said they found nothing amiss in the slaughterhouse there.

In examining Cargill, investigators discovered that their own inspectors had lodged complaints about unsanitary conditions at the plant in the weeks before the outbreak, but that they had failed to set off any alarms within the department. Inspectors had found "large amounts of patties on the floor," grinders that were gunky with old bits of meat, and a worker who routinely dumped inedible meat on the floor close to a production line, records show.

Although none were likely to have caused the contamination, federal officials said the conditions could have exacerbated the spread of bacteria. Cargill vowed to correct the problems. Dr. Petersen, the federal food safety official, said the department was working to make sure violations are tracked so they can be used "in real time to take action."

The U.S.D.A. found that Cargill had not followed its own safety program for controlling E. coli. For example, Cargill was supposed to obtain a certificate from each supplier showing that their tests had found no E. coli. But Cargill did not have a certificate for the Uruguayan trimmings used on the day it made the burgers that sickened Ms. Smith and others.

After four months of negotiations, Cargill agreed to increase its scrutiny of suppliers and their testing, including audits and periodic checks to determine the accuracy of their laboratories.

A recent industry test in which spiked samples of meat were sent to independent laboratories used by food companies found that some missed the E. coli in as many as 80 percent of the samples.

Cargill also said it would notify suppliers whenever it found E. coli in finished ground beef, so they could check their facilities. It also agreed to increase testing of finished ground beef, according to a U.S.D.A. official familiar with the company's operations, but would not test incoming ingredients.

Looking to the Future

The spate of outbreaks in the last three years has increased pressure on the Agriculture Department and the industry.

James H. Hodges, executive vice president of the American Meat Institute, a trade association, said that while the outbreaks were disconcerting, they followed several years during which there were fewer incidents. "Are we perfect?" he said. "No. But what we have done is to show some continual improvement."

Dr. Petersen, the U.S.D.A. official, said the department had adopted additional procedures, including enhanced testing at slaughterhouses implicated in outbreaks and better training for investigators.

"We are not standing still when it comes to E. coli," Dr. Petersen said.

The department has held a series of meetings since the recent outbreaks, soliciting ideas from all quarters. Dr. Samadpour, the laboratory owner, has said that "we can make hamburger safe," but that in addition to enhanced testing, it will take an aggressive use of measures like meat rinses and safety audits by qualified experts.

At these sessions, Felicia Nestor, a senior policy analyst with the consumer group Food and Water Watch, has urged the government to redouble its effort to track outbreaks back to slaughterhouses. "They are the source of the problem," Ms. Nestor said.

For Ms. Smith, the road ahead is challenging. She is living at her mother's home in Cold Spring, Minn. She spends a lot of her time in physical therapy, which is being paid for by Cargill in anticipation of a legal claim, according to Mr. Marler. Her kidneys are at high risk of failure. She is struggling to regain some basic life skills and deal with the anger that sometimes envelopes her. Despite her determination, doctors say, she will most likely never walk again.
A System's Flaws

Dr. Jeffrey Bender, a food safety specialist with the U.S. Department of Agriculture, notes that despite the efforts of federal and state inspectors, many meat products are contaminated by Escherichia coli, a bacteria that can cause severe illness.

The E. coli risk is also present at the slaughterhouses where the meat is produced. The E. coli bacteria can enter the carcasses with hot water and lactic acid used to wash them prior to sending them to the cutting floor. The bacteria can also spread through the meat when it is handled improperly, as workers may not wash up thoroughly after handling feces.

The E. coli bacteria can also enter the meat through feedlot waste, which is often smeared on the meat. The bacteria can also enter the slaughterhouse through the air, as workers may not wear proper protective clothing.

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Anatomy of a Burger

Confidential grinding logs and other records and interviews reveal the ingredients and E. coli issues in a typical hamburger sold by grocers and fast-food restaurants. This patty was made by the food giant Cargill, which recalled 844,812 pounds of ground beef on Oct. 6, 2007, after an estimated 940 people were sickened, including Stephanie Smith, 22, of Cold Spring, Minn.

<table>
<thead>
<tr>
<th>Greater Omaha Packing</th>
<th>FRESH FAT</th>
<th>Trimmings from whole cuts of meat, known as 50:50 – half fat, half beef.</th>
<th>Washing carcasses and takes other steps to remove fecal contamination that harbors the virulent strain of E. coli known as O157:H7.</th>
<th>In addition to the trimmings and textured beef, the frozen patties contain bread crumbs and spices.</th>
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<td>Lone Star Beef Processors</td>
<td>FRESH LEAN</td>
<td>Trimmings of meat from dairy cows and bulls that are too old for feedlot fattening.</td>
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<td>Slaughterhouse Uruguay</td>
<td>FROZEN LEAN</td>
<td>Trimmings from grass-fed cattle.</td>
<td>Annual audits by the U.S.D.A. found some sanitation flaws in Uruguay’s meat operations, including improper testing for E. coli, which officials say they have corrected.</td>
<td>The U.S.D.A. has urged hamburger grinders to test their ingredients for E. coli before processing to increase the chance of preventing an outbreak. Slaughterhouses do some testing. But few grinders test ingredients, citing costs and fears of recalls.</td>
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<tr>
<td>Beef Products Inc. Dakota Dunes, S.D.</td>
<td>LEAN FINELY TEXTURED BEEF</td>
<td>Trimmings warmed and put through a centrifuge to remove fat and treated with ammonia to kill bacteria.</td>
<td>Spot checks by school lunch officials in 2006, 2008 and again in August found E. coli in the product that was treated with ammonia. The company said it adjusted its operations after the 2008 finding.</td>
<td>The vast majority of E. coli illnesses resolve themselves without complications, according to the Centers for Disease Control and Prevention. While most infections are limited to the intestines, some 7 to 10 percent develop into a condition called hemolytic uremic syndrome, which can affect kidney function. While most cases of hemolytic uremic syndrome recover, a disproportionate number of children develop kidney problems. Some develop strokes. The symptoms, which are not present in everyone, can include low blood pressure, severe pain in the stomach, vomiting, diarrhea and trouble breathing.</td>
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The Frozen Burger Ms. Smith’s Illness

Five days after having the grilled burgers, Ms. Smith was admitted to St. Cloud Hospital in Minnesota with excruciating pain. Ms. Smith’s illness was linked to the LEAN hamburger only by chance. Her aunt still had some of the frozen patties, and were contaminated with a powerful strain of E. coli that was genetically identical to the pathogen that had sickened other Minnesotans.

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Moreover, the state officials discovered that the supplier had sent the tainted meat.

On Friday, Oct. 5, 2007, a Minnesota administrator with the department’s Food Safety and Inspection Service, said that the department could mandate testing, but ... well as consumers. “I have to look at the entire industry, not just what is best for public health,” Dr. Petersen said.

But the pathogen is so powerful that Concedes that the best slaughterhouse practices cannot guarantee that trimmings will be free of the pathogen.

Trimmings of meat from dairy cows and bulls that are too old for feedlot fattening.

Butler, Wis.

Concedes that the best slaughterhouse practices cannot guarantee that trimmings will be free of the pathogen.

In October 2007, the agency issued a notice recommending that processors conduct at least a few tests a year to verify the testing done by slaughterhouses.

The vast majority of E. coli illnesses...
Stephanie Smith, 22, was paralyzed after being stricken by E. coli in 2007. Officials traced the E. coli to hamburger; her family had eaten American Chef’s Selection Angus Beef Patties at a Sunday dinner.
Food Safety Problems Elude Private Inspectors

By MICHAEL MOSS and ANDREW MARTIN

When food industry giants like Kellogg want to ensure that American consumers are being protected from contaminated products, they rely on private inspectors like Eugene A. Hatfield. So last spring Mr. Hatfield headed to the Peanut Corporation of America plant in southwest Georgia to make sure its chopped nuts, paste and peanut butter were safe to use in things as diverse as granola bars and ice cream.

The peanut company, though, knew in advance that Mr. Hatfield was coming. He had less than a day to check the entire plant, which processed several million pounds of peanuts a month.

Mr. Hatfield, 66, an expert in fresh produce, was not aware that peanuts were readily susceptible to salmonella — which he was not required to test for anyway. And while Mr. Hatfield was inspecting the plant to reassure Kellogg and other food companies of its suitability as a supplier, the Peanut Corporation was paying for his efforts.

“The overall food safety level of this facility was considered to be: SUPERIOR,” he concluded in his March 27, 2008, report for his employer, the American Institute of Baking, which performs audits for major food companies. A copy of the audit was obtained by The New York Times.

Federal investigators later discovered that the dilapidated plant was ravaged by salmonella and had been shipping tainted peanuts and paste for at least nine months. But they were too late to prevent what has become one of the nation's worst known outbreaks of food-borne disease in recent years, in which nine are believed to have died and an estimated 22,500 were sickened.

With government inspectors overwhelmed by the task of guarding the nation's food supply, the job of monitoring food plants has in large part fallen to an army of private auditors like Mr. Hatfield. And the problems go well beyond peanuts.

An examination of the largest food poisoning outbreaks in recent years — in products as varied as spinach, pet food, and a children's snack, Veggie Booty — show that auditors failed to detect problems at plants whose contaminated products later sickened consumers.

In one case involving hamburgers fed to schoolchildren, the Westland/Hallmark Meat Company in California passed 17 separate audits in 2007, records show. Then an undercover video made that year showed the

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of the problems with third-party audits. Nonetheless, the F.D.A. has proposed expanding the role of private auditors to inspect the more than 200,000 foreign facilities that ship food to the United States. The agency has proposed a voluntary certification program that would toughen audit standards and alert federal authorities of problems — an idea that has met stiff resistance from the food industry.

Food safety advocates say that audits can play a useful role in improving sanitation and catching problems. But in case after case, the audits have failed to prevent major outbreaks.

In 2007, Keystone Foods, the Pennsylvania plant that makes Veggie Booty, received an “excellent” rating from the American Institute of Baking. But the audit did not extend to ingredient suppliers, including a New Jersey company whose imported spices from China were tainted with salmonella. “AIB emphasizes the educational value of its inspection procedure to the management and employees of the facilities it provides services to,” he said.

Mr. Munyon acknowledged that auditors were allowed to solicit contracts from plants that they then audited, but said this posed no ethical issue because the auditors were on salary, not paid by commission. Mr. Hatfield first audited the Peanut Corporation plant in Georgia in 2007 after contacting the plant’s managers to solicit their business.

The American Institute of Baking’s dual role as an educator and inspector troubles some in the food industry, as does its expansion beyond baking audits. Before the salmonella outbreak, Costco had rebuffed repeated proposals by the organization to inspect all its food suppliers.

“The American Institute of Baking is bakery experts,” said R. Craig Wilson, the top food safety officer at Costco. “But you stick them in a peanut butter plant or in a beef plant, they are stuffed.”

Costco, Kraft Foods and Darden Restaurants are among a group of food manufacturers and other companies that use detailed plans to prevent food safety hazards. They also supplement third-party audits with their own inspections and testing of ingredients and plant surfaces for microbes.

The American Institute of Baking was not alone in missing the trouble at the Peanut Corporation
plant in Blakely, Ga. State inspectors also found only minor problems, while a federal team last month uncovered a number of alarming signs, as well as testing records from the company itself that showed salmonella in its products as far back as June 2007. Federal health officials say there

A federal proposal for tougher standards met industry resistance.

are now 677 officially reported cases of salmonella poisoning in the outbreak, which reflects only about 3 percent of the total number of people sickened.

But the baking institute's private audit of the peanut plant had particular heft in assuring food makers that the processed peanuts were safe. Plant workers, in interviews with The Times, also cited the audits' findings when asked why they did not pursue their own concerns about the plant.

Another audit of the peanut plant, by the Michigan-based NSF Cook & Thurber, raises further questions about the usefulness of private audits. That audit found nearly two dozen problems that it characterized as "minor," but it nonetheless gave the peanut plant an overall score of 91 out of 100.

NSF officials said that for their audits, this was a low score. But the company that paid for the audit, the insurance giant American International Group, then sold the peanut company insurance to cover the costs of recalling products, according to lawyers for the Peanut Corporation.

Mr. Hatfield, who audited the peanut plant for the American Institute of Baking, referred questions to the organization, which said he "is degreed in biology" and "trained to do the job." In auditing the Blakely plant last March, Mr. Hatfield became concerned about his ability to check the plant thoroughly and asked for more than the one day allotted, according to people familiar with the audit. The Peanut Corporation agreed to pay for the additional time, but only in future audits, according to those people.

Mr. Hatfield checked to see that the plant had a system in place to test its products for contamination, but the audit indicated that he did not ask to see any test results for salmonella and therefore did not know that the plant had found the bacteria.

"I never thought that this bacteria would survive in the peanut type environment," Mr. Hatfield wrote to a food safety expert on Jan. 20, after the deadly salmonella outbreak was made public, according to a copy of his e-mail message. "What the heck is going on??"
Future Dim for Nuclear Waste Repository audits. Nonetheless, the F.D.A. of the problems with third-party audits to bakery vendors, has recalled more than a dozen products by the American Institute Executive, said his group's inspection. Few have grown faster of food companies to fix problems, it is up to the discretion of auditors who had identified nu-
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ings to those facilities. 

Westland/Hallmark frozen beef was dumped in a Los Angeles County, Calif., landfill last March. A video made at a Westland/Hallmark plant, left, led to a recall of millions of pounds of beef. Recalled peanut butter crackers, right, awaited disposal last month at an Indianapolis food bank.
Company’s Record on Treatment of Beef Is Called Into Question

By MICHAEL MOSS

Eight years ago, federal officials were struggling to remove potentially deadly E. coli from hamburgers when an entrepreneurial company from South Dakota came up with a novel idea: injecting beef with ammonia.

The company, Beef Products Inc., had been looking to expand into the hamburger business with a product made from beef that included fatty trimmings the industry once relegated to pet food and cooking oil. The trimmings were particularly susceptible to contamination, but a study commissioned by the company showed that the ammonia process would kill E. coli as well as salmonella.

Officials at the United States Department of Agriculture endorsed the company’s ammonia treatment, and have said it destroys E. coli “to an undetectable level.” They decided it was so effective that in 2007, when the department began routine testing of meat used in hamburger sold to the general public, they exempted Beef Products.

With the U.S.D.A.’s stamp of approval, the company’s processed beef has become a mainstay in America’s hamburgers. McDonald’s, Burger King and other fast-food giants use it as a component in ground beef, as do grocery chains. The federal school lunch program used an estimated 5.5 million pounds of the processed beef last year alone.

But government and industry records obtained by The New York Times show that in testing for the school lunch program, E. coli and salmonella pathogens have been found dozens of times in Beef Products meat, challenging claims by the company and the U.S.D.A. about the effectiveness of the treatment. Since 2005, E. coli has been found 3 times and salmonella 48 times, including back-to-back incidents in August in which two 27,000-pound batches were found to be contaminated.

The meat was caught before reaching lunch-rooms trays.

In July, school lunch officials temporarily banned their hamburger makers from using meat from a Beef Products facility in Kansas because of salmonella — the third suspension in three years, records show. Yet the facility remained approved by the U.S.D.A. for other customers.

Presented by The Times with the school lunch test results, top department officials said they were not aware of what their colleagues in the lunch program had been finding for years.

In response, the agriculture department said it was revoking

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Beef Products’ exemption from routine testing and conducting a review of the company’s operations and research. The department said it was also reversing its policy for handling Beef Products during pathogen outbreaks. Since it was seen as pathogen-free, the processed beef was excluded from recalls, even when it was an ingredient in hamburgers found to be contaminated.

The Beef Products case reveals a schism between the main Department of Agriculture and its division that oversees the school lunch program, a divide that underscores the government’s faltering effort to make hamburger safe. The U.S.D.A. banned the sale of meat found to be contaminated with the O157:H7 strain of E. coli 15 years ago, after a deadly outbreak was traced to Jack in the Box restaurants. Meat tainted with salmonella is also a hazard. But while the school lunch program will not buy meat contaminated with salmonella, the agriculture department does not ban its sale to the general public.

Even so, E. coli outbreaks nationwide have increased in recent years. And this summer, two outbreaks of particularly virulent strains of salmonella in hamburger prompted large recalls of ground beef across several states.

Although no outbreak has been tied to Beef Products, officials said they would thoroughly scrutinize any future industry innovations for fighting contamination “to ensure that they are scientifically sound and protect public health,” and that they were examining the government’s overall meat safety policies.

The founder and owner of Beef Products, Eldon N. Roth, declined requests for interviews or access to the company’s production facilities. Responding to written questions, Beef Products said it had a deep commitment to hamburger safety and was continually refining its operation to provide the safest product possible. “B.P.I.’s track record demonstrates the progress B.P.I. has made compared to the industry norm,” the company said. “Like any responsible member of the meat industry, we are not perfect.”

Beef Products maintains that its ammonia process remains effective. It said it tests samples of each batch it ships to customers and has found E. coli in only 0.06 percent of the samples this year.

The company said its processing beef, a mashlike substance frozen into blocks or chips, is used in a majority of the hamburger sold nationwide. But it has remained little known outside industry and government circles. Federal officials agreed to the company’s request that the ammonia be classified as a “preservation agent” and not an ingredient that would be listed on labels.

Within the U.S.D.A., the treated beef has been a source of friction for years.

Griff Palmer contributed reporting.

The department accepted the company’s own study as evidence that the treatment was effective. School lunch officials, who had some doubts about its effectiveness, required that Beef Products meat be tested, as they do all beef used by the program.

School lunch officials said that in some years Beef Products testing results were worse than many of the program’s two dozen other suppliers, which use traditional meat processing methods. From 2005 to 2009, Beef Products had a rate of 36 positive results for salmonella per 1,000 tests, compared to a rate of nine positive results per 1,000 tests for the other suppliers, according to statistics from the program. Beef Products said its testing regime was more likely to detect contamination.

Despite some misgivings, school lunch officials say they use Beef Products because its price is substantially lower than ordinary meat trimmings, saving about $1 million a year.

Another snapshot of processed beef’s performance emerges from confidential records of tests in 2007 by the food giant Cargill. In the preceding year and a half, Cargill, which used more than 50 vendors, suspended three facilities for excessive salmonella, were Beef Products plants, records show.

Since introducing the treated meat, Beef Products has faced the challenge of balancing safety with taste, records and interviews show.

Pathogens died when enough ammonia was used to raise the alkalinity of the beef to a high level, company records show. But early on, school lunch officials and other customers complained about the taste and smell of the beef. Samples of the processed beef obtained by The Times revealed lower levels of alkalinity, suggesting less ammonia was used.

Beef Products acknowledged lowering the alkalinity, and the U.S.D.A. said it had determined that “at least some of B.P.I.’s product was no longer receiving the full lethality treatment.”

Beef Products said it had submitted new research to the agriculture department showing that its treatment remained effective with lower alkalinity. Agriculture officials said Beef Products’ latest study is under review.

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A Safety Solution

Headstrong and self-assured, Eldon N. Roth had the good fortune of being in the right place at the right time.

Mr. Roth spent the 1990s looking to improve the price of beef. In higher grades of beef. According to a 2003 study financed by Beef Products, the trimmings “typically includes most of the material from the outer surfaces of the carcass” and contains “larger microbiological populations.” Beef Products said it also used trimmings from inside cuts of meat.

Mr. Roth was well suited to tackle the problem, friends say. Though lacking a science background, he had a knack for machinery and obtained patents for over two dozen pieces of equipment and methods used in processing beef.

“He looked and looked at stuff and always wondered, why can’t it be done this way?” said Dr. David M. Theno, a food-safety consultant in Manhattan who knew Mr. Roth. “He is like a lot of inventors. Not everyone sees Eldon’s vision.”

One of Mr. Roth’s early trials involved running electricity through the trimmings to kill bacteria, Dr. Theno and others said. Mr. Roth eventually settled on ammonia, which had been shown to suppress spoilage. Meat taints through thin pipes where it is exposed to ammonia gas, then flash frozen and compressed — all steps that help kill pathogens, company research found.

The treated beef landed in Washington in 2001, when federal officials were searching for ways to eliminate E. coli. Beef Products already had one study showing its treatment would do that; another company-sponsored study by an Iowa State University professor that was published in a professional journal seconded that finding.

Mr. Roth asserted that his product would kill pathogens in untreated meat when it was used as an ingredient in ground beef — raising the prospect of a risk-free burger. “Given the technology, we firmly believe that the two pathogens of major concern in raw ground beef — E. coli O157:H7 and salmonella — are on the verge of elimination,” Mr. Roth wrote to the department.

The Food and Drug Administration signed off on the use of ammonia, concluding it was safe when used as a processing agent in foods. This year, a top official with the U.S.D.A.’s Food Safety and Inspection Service said, “It eliminates E. coli to the same degree as if you cooked the product.”

Carl S. Custer, a former U.S.D.A. microbiologist, said he and other scientists were concerned that the department had approved the treated beef for sale without obtaining independent validation of the potential safety risk. Another department microbiologist, Gerald Zirnstein, called the processed beef “pink slime” in a 2002 e-mail message to colleagues and said, “I do not consider the stuff to be ground beef, and I consider allowing it in ground beef to be a form of fraudulent labeling.”

One of the toughest hurdles for Beef Products was the Agricultural Marketing Service, the U.S.D.A. division that buys food for school lunches. Officials cited complaints about the odor, and wrote in a 2002 memorandum that they...
had “to determine if the addition of ammonia to the product is in the best interest to A.M.S. from a quality standpoint.”

“It is our contention,” the memo added, “that product should be labeled accordingly.”

Represented by Dennis R. Johnson, a top lawyer and lobbyist for the meat industry, Beef Products prevailed on the question of whether ammonia should be listed as an ingredient, arguing that the government had just decided against requiring another company to list a chemical used in treating poultry.

School lunch officials said they ultimately agreed to use the treated meat because it shaved about 3 cents off the cost of making a pound of ground beef.

“Several packers have unofficially raised concern regarding the use of the product since the perception of quality is inferior,” the 2002 memo said. “But will use product to obtain lower bid.”

In 2004, lunch officials increased the amount of Beef Products meat allowed in its hamburgers to 15 percent, from 10 percent, to increase savings. In a taste test at the time, some school children favored burgers with higher amounts of processed beef.

Beef Products does not disclose its earnings, but its reported production of seven million pounds a week would generate about $440 million in annual revenue, according to industry records.

Dr. Theno, the food safety consultant, applauds Mr. Roth for figuring out how to convert high-fat trimmings “with no functional value.”

“There were some issues with that,” Dr. Theno said. “But he, and God bless him, amased a tidy fortune for it.”

As sales took off, Mr. Roth started offering a buy-back guarantee: If any of the most virulent E. coli was found in ground beef containing Beef Products meat, the company would buy the tainted meat.

This was based on Mr. Roth’s initial prediction that his treated beef could kill E. coli in any meat it was mixed with. The company acknowledges that its subsequent study found no evidence to back that up, although it says it is now trying with an enhanced treatment. The guarantee remains on the company Web site: “Contact a B.P.I. sales representative today to take the challenge!”

**Odor and Alkalinity**

As suppliers of national restaurant chains and government-financed programs were buying Beef Product meat to use in ground beef, complaints about its pungent odor began to emerge.

In early 2003, officials in Georgia returned nearly 7,000 pounds to Beef Products after cooks who were making meatloaf for state prisoners detected a “very strong odor of ammonia” in 60-pound blocks of the trimmings, state records show.

“It was frozen, but you could still smell ammonia,” said Dr. Charles Tant, a Georgia agriculture department official. “I’ve never seen anything like it.”

Unaware that the meat was treated with ammonia — since it was not on the label — Georgia officials assumed it was accidentally contaminated and alerted the agriculture department. In their complaint, the officials noted that the level of ammonia in the beef was similar to levels found in contamination incidents involving chicken and milk that had sickened schoolchildren.

Beef Products said the ammonia did not pose a danger and would be diluted when its beef was mixed with other meat. The U.S.D.A. accepted Beef Product’s conclusion, but other customers had also complained about the smell.

Untreated beef naturally contains ammonia and is typically about 6 on the pH scale, near that of rain water and milk. The Beef Products’ study that won U.S.D.A. approval used an ammonia treatment that raised the pH of the meat to as high as 10, an alkalinity well beyond the range of most foods. The company’s 2003 study cited the “potential issues surrounding the palatability of a pH-9.5 product.”

Soon after getting initial approval from the agriculture department, the company devised a plan to make a less alkaline version of the beef, internal company documents show. Beef Products acknowledged in an e-mail exchange that it was making a lower pH version, but did not specify the level or when it began selling it.

In 2008, after the school lunch program temporarily suspended a Beef Products plant for salmonella contamination, the company wrote in a letter that its effort to combat ammonia “aroma” might have reduced the alkalinity below the initial target levels. It said it was taking steps to ensure that the alkalinity remained elevated.

Samples of the treated beef obtained by The Times this month showed a pH as low as 7.75, according to an analysis by two laboratories. Dr. Michael P. Doyle, a food industry consultant and director of the Center for Food Safety at the University of Georgia, said one point on the exponential pH scale was a considerable difference, and “could have a significant effect on the antimicrobial effectiveness of the ammonia.”

This month, Beef Products provided The Times with new research that the company said showed that E. coli and salmonella were undetectable at a pH level of 8.3. The agriculture department is still investigating the Oregon outbreak.
said it did not learn that Beef Products was using lower levels until October, after inquiries by The Times, and that it was studying the company’s research. McDonald’s, whose hamburgers have contained Beef Products meat since 2004, declined to say if it monitored it for pH. But Danya Proud, a chain spokeswoman, said, “We expect the pH level to meet the specifications that are approved by the U.S.D.A.”

Contagion and Notification

At 6:36 a.m. on Aug. 10, the Beef Products plant in South Sioux City, Neb., started up its production line for the school lunch program. In 60 minutes, the plant produced a batch of 26,880 pounds of processed beef that tested positive for E. coli.

Six days later at the same plant, another 26,880-pound lot was found to have salmonella, government records and interviews show. Within hours of confirming the contamination, the school lunch division of the Agriculture Department in Washington began investigating.

Just down the hall at department headquarters, the division that oversees meat for the general public did not conduct its own inquiry for another month and half, after receiving questions from The Times.

The problems in South Sioux City came shortly after school lunch officials had suspended a Beef Products plant in Holcomb, Kan., for excessive salmonella. The main U.S.D.A. was not notified of the suspension by school lunch officials, and the plant continued to supply other customers.

Agriculture Secretary Tom Vilsack has since directed school lunch officials to share information about their suspensions with the department’s meat safety division.

In addressing the latest contamination cases in Nebraska, Beef Products said it suspected a glitch in its treatment operations, referring to ammonia gas by its chemical name, NH₃, according to an e-mail message to school lunch officials.

“The system was stopped for two minutes in order to install a new valve,” the company said. “When the system was restarted, there was product flow for approximately one minute without NH₃ flow.”

After the school lunch officials replied that the glitch might explain only one of the two episodes, Beef Products shifted focus to its suppliers, saying it would more closely scrutinize them for contamination.

Under the U.S.D.A.’s new policy for Beef Products, the company itself is also likely to get more scrutiny.

Cargill, one of the nation’s largest hamburger makers, is a big buyer of Beef Products’ ammoniated trimmings for its patties. Company records show that Beef Products, like other suppliers, has periodically exceeded Cargill’s limits on acceptable bacteria levels. That led Cargill to stop buying meat from two Beef Products plants for several months in 2006 after company tests showed excessive levels of salmonella.

But the following year, when Cargill faced an E. coli outbreak, it ruled out Beef Products as a possible culprit, citing the U.S.D.A.’s view that the ammonia treatment provided a “lethality step” for the pathogen. In addition, Cargill officials said recently, they suspect that another supplier, not Beef Products, was the problem. As a result, Beef Products did not face as wide a recall as other Cargill suppliers.

Recently, another E. coli outbreak was traced to a hamburger maker in upstate New York that also used multiple suppliers, including Beef Products. This time, the agriculture department said Beef Products was being recalled with other suppliers, although a source of the contamination had not been identified.

“This will continue to be our approach going forward,” the department said.
Beef Products does not disclose its earnings, but its reported production of seven million pounds a week would generate about $440 million in annual revenue, according to industry records.

Beef Products' ammonia process remains effective. It said it tests samples of each batch it ships to customers and has found E. coli in only 0.06 percent of the samples this year.

Within the U.S.D.A., the treated beef has been a source of friction for years. The department accepted the company's own study as evidence that the treatment was effective. But other customers, who did not participate in the study, remained skeptical and, under the U.S.D.A.'s new policy for other additive meat, required that Beef Products meat be tested, as they do all beef used by the program.

Some years Beef Products testing results were worse than many of the program's two dozen other suppliers, which use other additives. Beef Products said its testing regime was more likely to detect contamination.

In addressing the latest contamination episode, Beef Products said the ammonia did not pose a danger and would be diluted when its beef was mixed with other meat. The U.S.D.A. accepted Beef Products' conclusion, but other customers had also complained about the smell.

THE PRODUCT
A Beef Products Inc. processing plant in South Sioux City, Neb. The company injects fatty beef trimmings with ammonia to remove E. coli and salmonella. Below, a block of ammonia-treated beef from Beef Products Inc.