After Katrina

A firsthand account of SH&E issues in refrigeration recovery

By Grace Kilgore

HURRICANE KATRINA captured the world's attention when it struck Aug. 29, 2005. The destruction it caused posed many threats to safety and health. This article discusses safety and health issues related to the refrigeration recovery effort at the landfill location in Jefferson Parish that received unsalvageable refrigerators, freezers and air conditioners from residents. The U.S. Army Corps of Engineers (the Corps) has called the refrigeration recovery site "the largest refrigeration recovery site in the world" (Photo 1).

The destruction from Hurricane Katrina was historic. Among many other things, the hurricane severely damaged the electrical grid, causing widespread loss of electrical service across the devastated region. It took more than a month to reinstate electrical service to most houses and businesses in Jefferson Parish. As a result, the contents of refrigerators and freezers across the parish spoiled, leading to growth of bacteria, mold and fungi, and creating a biohazard situation for returning residents. A biohazard is defined as a biological substance that poses a threat to (primarily) human health. According to OSHA, bacteria, mold and fungi are also biological agents.

After a disaster like Katrina, disease is a major concern. In New Orleans, public health officials were concerned about illnesses from rotten food and floodwater, mosquito-borne illnesses and other diseases that could lead to a health epidemic. The bacteria, mold and fungi that thrive on rotten food can cause health problems from respiratory ailments to dysentery.

The Scope of the Recovery Effort

Upon returning to their homes and business, many residents received conflicting advice from multiple sources. Some parish officials and various insurance companies directed residents to leave the food in their refrigerators, tie them shut and place them curbside for pickup. Others recommended that the contents be placed into trash bags before the units were placed curbside. Others advised residents to dispose of the contents, then salvage the appliances through an extended series of cleaning and sanitizing steps.

In addition, some discarded refrigerators came from laboratories and medical or veterinary offices, where they had been used to store lab samples and blood products. This introduced the potential for exposure to bloodborne pathogens. In addition, hospitals, pharmacies and residents often store medications in the refrigerator, creating yet another potential exposure hazard.

Beyond the health threats to the public were those posed to workers participating in the cleanup effort. The workers' families could also be affected by secondhand exposure to diseases if worksite housekeeping is not carefully monitored and if worker hygiene is not strictly controlled.

Faced with this situation, the question became how to dispose of the refrigerators and freezers and their contents as soon as possible to avoid health threats and prevent the outbreak of diseases.

While a typical landfill receives an anticipated amount of degrading food each day, the refrigeration recovery site had to prepare to receive an unprecedented number of refrigerators and a large amount of decaying food from approximately 3,000 refrigeration units each day. In addition to residential units, thousands of commerical refrigeration units from restaurants, grocery stores, medical facilities and other businesses were discarded. No walk-in freezers were discarded during this time frame.

In the early stages of cleanup, the refrigeration recovery site was administered by the Federal Emergency Management Agency (FEMA). The site was later handed over to the Corps for management.

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Photo 1: Jefferson Parish recovery site. Taken at the beginning of the project, the image shows the vast number of refrigerators that needed to be recycled. Many more appliances remained to be recovered.

Photo 2: Collection trailers line up to dump the refrigerators to begin the recycling process.

Other government entities such as OSHA, EPA and the Louisiana Department of Environmental Quality (DEQ) were present to perform weekly inspections. DEQ also conducted daily air monitoring. Some subcontractors received OSHA citations early in the effort, which quickly led to compliance by all subcontractors thereafter.

Initial estimates suggested that the refrigeration recovery effort in Jefferson Parish would take 6 months. However, much of it was actually completed in 2 months, thanks in large part to two key factors:

1) two methods were used simultaneously to recover and recycle refrigerators;

2) other parishes were able to conduct their own refrigeration recovery efforts. (Originally, it was thought that refrigerators from other parishes would need to be recycled in Jefferson Parish, which would have extended the project's duration.)

The Corps was responsible for all safety and health issues. The general contractor was required to provide a site safety manager to liaise between Corps personnel, the contractor and subcontractors on site. This manager was responsible for implementing the requirements of the various government agencies. The list of requirements was exhaustive, yet typical of each agency. For example, OSHA 29 CFR Part 1926 regulations were in effect and enforced as were other regulations.

The bacteria, mold, mildew and fungi growing on the decaying food in the refrigerators and freezers were considered to be a biohazard by EPA. Since the agency would not allow this material to be buried in the regular landfills because of both current and future potential health risks, the food had to be removed and brought to a different landfill. Recycling was deemed the best method of disposing of the refrigerators.

The Recovery Process

The recovery process was designed to accomplish three objectives:

1) Collect the refrigerators and count them for statistical purposes.

2) Transport the refrigerators to the landfill.

3) Dispose of the refrigerators, freezers and coolers.

To achieve this, the following steps were devised.

1) Collection subcontractors collected the refrigerators, delivered them to the landfill and unloaded them in a specified area. Since recovery workers had no way of knowing whether they were collecting full or empty refrigerators, all units were treated as though they contained spoiled contents.

2) Refrigeration subcontractors removed Freon from all refrigerators, freezers and air conditioning units. They hauled the used Freon away for proper disposal at another site.

3) The subcontracted labor pool cleaned out the refrigerators by hand. Contents were either placed into bags by hand and carried away by skid steer loaders and loaded onto trailers, or were scraped out using hoes into Dumpsters that had been set into 6-ft-deep pits. The Dumpsters were then hauled to a separate landfill where the food was buried.

4) The emptied refrigerators were then loaded into trucksby excavators and skid steer loaders.

5) The trucks hauled the refrigerators to a separate part of the site where they were loaded into a crusher.

6) The crushers compacted the refrigerators and created bundles to be moved to a different site for incineration.

7) At another site, the bundles were incinerated at various temperatures. As the temperature increased, each metal was melted at a different temperature and extracted until only the fluff remained. The fluff was incinerated last because it needed the highest temperature. There were two objectives to be accomplished: Extract copper, aluminum and nickel to be salvaged and sold; and completely incinerate the other components then haul them to yet another landfill.

Photo 2 shows a line of trucks containing refrigerators collected from the streets. Photo 3 shows the tower used to count the refrigerators when trucks were too large to count the appliances from ground level. The site safety manager also used the tower each day to get a bird's eye view of the site in order to identify potential problems.

Recovery Issues & Concerns

In addition to the safety issues inherent with heavy equipment and the biohazards of landfills (which are not addressed in this article), specific concerns at the refrigeration recovery site included how to:

1) remove the spoiled contents from the refrigeration units without exposing workers to potential disease vectors;

2) dispose of the contents to protect parish residents from the decaying matter;

3) prevent diseases associated with contaminated food and appliances exposed to toxic floodwaters;

4) avoid worker exposure to possible bloodborne pathogens;

5) educate workers to function in an environment with potential molds, bacteria and other biohazard exposures.

Establishing Safety Protocol

Once a process for recycling was established and key hazards were identified, it was necessary to address the safety and health issues directly and indirectly related to the refrigerators, freezers and contaminated food. All protocols were drafted by the Corps since it was ultimately responsible for site safety and health.

Many safety and health protocols were implemented, including:

- bloodborne pathogens;
- working with heavy equipment;
- use of appropriate PPE;
- accident reporting.

Specific issues directly related to the refrigeration site included:

- determining the best PPE for use when working with these specific biohazards;
- developing procedures to prevent potential exposure to bloodborne pathogens;
- ensuring that methods were in place to certify that every member of a high turnover workforce had current tetanus immunization;
- addressing air quality concerns while working with the contaminated food.

In addition, several other concerns were identified and addressed. Workers came from many different backgrounds and workers with different job descriptions worked side-by-side. Subcontractors worked together as a team with workers who had various skills and backgrounds. Skill levels ranged from day laborers to heavy equipment operators. It was crucial that they understood not only the scope of their job, but also the scope of others' jobs.

In addition, many of the workers, their managers and supervisors had just experienced a life-altering event and were still feeling its effects. Due to the nature of the operation—a disaster response site—typical resources such as employee assistance programs were not available to help workers deal with the stress and trauma caused by the hurricane.

Photo 3 (left): The tower was used to count the refrigerators when they could not be seen well from the ground. The site safety manager also used the tower each day to survey the site before beginning a walk-through inspection.

Photo 4 (below): Workers suit up in PPE. The freight container is next to the decontamination area.

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Working at the Recovery Site

PPE

Employees who emptied refrigerators by hand wore gloves taped closed to their coveralls, which had elastic cuffs at the wrists and ankles. They also wore foot coverings and used safety glasses and particle respirators to protect against squirting, spraying, splashing and exploding organic matter.

Employees who unloaded refrigerators by scraping the food out with a hoe and into Dumpsters wore the same PPE with twoexceptions—they wore full faceshields over their safety glasses and heavy aprons. The extra gear was needed because this removal technique made it more likely that the contents could splash employees. That is, with the greater force used for removal, the contents could travel a greater distance, making it more likely to reach unprotected body parts.

PPE needs were predetermined by FEMA and the Corps. PPE was distributed to the workforce daily. Because of high turnover, PPE training was conducted daily. PPE was stored in a freight container on site (Photo 4). Because of high heat and humidity, working while wearing PPE was difficult. To address heat stress issues, water was constantly available and workers took regular breaks.

To help control exposure to biohazardous material, a decontamination area was set up at the entrance to the site, near the freight container where PPE was stored. The decontamination area was located in an open area—separate from the eating area—with tables set up for sanitizing and marked containers for contaminated PPE. Employees were required to decontaminate before lunch and at the end of the day. Fresh PPE was worn after lunch.

The Lighter Side of a Dark Situation

The refrigeration recovery effort was a serious public health undertaking. However, a somewhat light side appeared during the project.

- The most common refrigerator magnets found were advertisements for plaintiff attorneys specializing in work-related accident litigation.
- The most common graffiti was that a certain local politician was "inside" the particular refrigerator and other political commentaries.
- The most common pranks were to leave pieces of wigs sticking out the closed doors or heads of dolls on the shelves.
- The most common myth was that $168,000 was found in one refrigerator (only a few coins were found).

Wearing the correct PPE was critical because of all the safety and health risks associated with known and unknown biohazards, as well as the typical risks associated with working at a landfill site and operating heavy equipment. As the managing authority at the recovery site, the Corps selected the PPE to be used and strictly enforced its use throughout the project. Unlike in some settings, few questioned these requirements. Through site orientations and prejob HazCom training, workers were acutely aware of the potential dangers at the site. In addition, as residents of the disaster area, many workers had lost their homes, jobs and even family members. No one wanted to further jeopardize lives by disregarding the safety rules.

A "we're all in this together" attitude further supported compliance. When workers realized that the rules applied to everyone on site—safety personnel included—and saw everyone complying, cooperation increased.

Case in point: One day, the site safety manager forgot to change her sunglasses for safety glasses. A flagger noticed and asked why she was not wearing safety glasses if everyone else was required to do so. The site safety manager told him that the same rules applied to her. She thanked him for bringing the situation to her attention, then retrieved the correct glasses. From that day forward, there was 100% compliance with the use of PPE. In addition, the site safety manager often heard long-term employees tell new employees to be sure to wear their PPE. Everyone focused on safety and, as a result, became empowered.

Containers

The containers in which food was stored presented another hazard. Glass can break easily. Plastic bags can leak. Unlabeled containers can hold surprises. In one case, an employee was removing a plastic bag from a refrigerator when the liquid began to leak under his gloves and onto his skin. Almost immediately he complained of itching. The affected skin was washed, first aid was administered and he was sent to the emergency room where he was treated with an antibiotic cream. The irritant could not be identified since no laboratory facilities were available within the disaster region. The bag and its contents were disposed of according to site protocol.

Odors

Odor was another issue. The stench at the site was often unbearable. DEQ monitored the air quality each day. Despite the horrendous smell, only particle respirators were required. DEQ did not discuss or share its findings other than to indicate that the air quality posed no threat to workers.

Although workers wore particle respirators, the odor of rotting organic matter was always present. Some employees were nauseated by the smell and had to be assigned to other duties.

Other employees rubbed menthol-eucalyptus cream on their respirators to mask the site's odor. This was not an officially sanctioned mitigation measure and the practice was only discovered after one employee spread the cream on a respirator that

was used by another employee by mistake. The second employee did not realize the cream was present and transferred it to his fingers, then to his face and eyes. He received first-aid treatment and was sent to the emergency room as a precaution.

Disease Prevention

Exposure to tetanus—from working with rusted refrigerators and items in the appliances such as tin cans—was another concern. Therefore, it became necessary to ensure that everyone working at the recovery site had current tetanus shots. Any worker who could not prove that his/her immunization was current was sent to a local clinic. During inspections, workers were asked to show their immunization records; if they could not produce them, the workers were removed from the site and sent to the clinic for immunization before being allowed to return to work.

As noted, potential exposure to bloodborne pathogens was a concern. However, no biological samples of bodily fluids were encountered, so this threat was never realized. A bloodborne pathogen plan was in place to mitigate risks of this exposure had it occurred.

The only exposure to bodily fluids on site was to blood after injuries. Latex gloves were available to the designated first-aid person. The only other possible source of exposure to bodily fluids was vomit from workers exposed to the noxious smell of rotting food. While this scenario was never realized, bleach was available at all times for cleanup if needed.

Communication

During the time that the recovery site operated, many workers were living in shelters or with family or friends. This created a transient workforce. Coupled with the noxious odor and poor work conditions, this contributed to a high worker turnover rate. Many of the workers who cleaned the refrigerators were day laborers—often, they would not return after one day of work.

To ensure that all employees had the benefit of training and the opportunity to ask questions, prejob safety meetings were held each morning. During these meetings, site management communicated information about the changing physical hazards of the site, informed workers of that day's expected incoming debris load and reminded them of the safety rules. The meeting agenda changed each day to prevent worker complacency, and many topics were covered, including biohazards, heat stress, working with and near heavy equipment, and correct use of PPE. In addition, any hazardous situations or problems detected on the site were addressed immediately and discussed at the next day's safety meeting.

On days when a sufficient number of returning workers were present along with a large number of new workers, two separate meetings were held—one to cover basic jobsite safety for new employees and another to discuss advanced topics for employees who had been working at the site for a longer time.

Two-way communication was also critical to site safety. To foster communication, the site safety manager walked the site several times each day to observe employees performing their job tasks. She asked questions and provided advice as needed to help the workers become comfortable enough to ask questions in return. This resulted in the identification of additional safety and health issues that could then be addressed.

The site presented many challenges that needed to be addressed quickly and decisively. No major injuries occurred, and only a few incidents caused employees to be transported to the emergency room, and then only as a precaution.

Conclusion

The refrigerator recovery effort was designed to prevent a potential public health crisis in addition to the catastrophic damage caused by Hurricane Katrina. The recovery site itself presented many safety and health challenges that needed to be addressed quickly and decisively.

No major injuries occurred at the site. Injuries that did occur included minor cuts, foreign objects in the eye and minor skin rashes—all of which were treated with first-aid measures. Only a few incidents caused employees to be transported to the emergency room, and then only as a precaution.

Many workers at the site had experienced a personal tragedy. The recovery process required a delicate balance of safety, hard work and dedication. Through the use of correct safety and health protocol, no incidents or outbreaks of disease occurred. While the sobering nature of the project itself kept safety and health issues at the forefront of everyone's mind, the implementation of correct safe practices kept all issues and incidents in check. ■

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