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Loss of Refrigeration – It Could Spoil Your Day

By James D. Redinger

Refrigeration is something the average person seldom thinks about. When was the last time you opened your refrigerator or freezer and paused to marvel at the fact that it stays cold with virtually no effort on your part? Have you stopped to think about what would happen to the contents if the refrigerator stopped working?

Refrigeration is a critical factor in many businesses that touch your life every day. Loss of refrigeration can not only shut down many businesses, it can also render their entire inventory unusable.

We All Depend On Refrigeration

For a perspective, it is easy for you to realize that refrigeration equipment is at work when you walk down the frozen foods aisle at your supermarket. How about when you stop by the combination gas station and quickie market on your way home and pick up a gallon of milk? Or when you order dinner at your favorite restaurant, or when your local school serves lunch to your children?

Do you think about refrigeration when your doctor gives you a shot? Do you wonder what temperature those boneless chicken breasts were stored at before you brought them home? Do you know how those goods on the frozen foods aisle were frozen to begin with?

What Is Spoilage?

A large number of businesses require refrigeration to prevent something from “spoiling.” For purposes of this discussion, we will define spoiling as something becoming unusable due to exposure to temperatures that are too high for too long a period of time.

To some frozen food businesses, “too high” might be 25 degrees F, and “too long” might be a few minutes. Many expensive drugs and pharmaceuticals are considered unusable if they are not constantly stored in a very narrow and closely monitored and documented temperature range.

To the business owner, spoilage might not just mean loss of today’s product or income. It could easily result in permanent loss of customers and adverse publicity that can affect potential customers.

So, What Can Go Wrong?

In a doctor’s office, a self-contained fully automated unit very similar to the one that you have in your home might supply refrigeration. An ice cream plant, however, might employ multiple large refrigeration systems that use ammonia as a refrigerant. They might maintain 25 degrees below zero F storage conditions that are controlled by very sophisticated and highly technical automatic electronic systems.

These systems “know” what different temperature and humidity ranges to maintain in different rooms and areas at different times of day and days of the week. They also may be programmed to run an automatic defrost cycle, told how often to monitor specific temperatures and when to consider a temperature excursion or refrigerant leakage a condition requiring an alarm. They may even dial a telephone to notify someone of that alarm.

Despite the advances in refrigeration systems condition monitors and controls, spoilage continues to occur in just about all types of businesses that use refrigeration. Spoilage can happen very quickly if proper temperatures are not maintained due to loss of refrigeration. Specific refrigeration equipment failure modes and examples have been exhaustively reported in previous issues of *The Locomotive*, but the major causes of spoilage today continue to be electrical power supply outages and mechanical failure of refrigeration equipment.

As systems become more and more sophisticated, however, an additional potential source of problems is the system controls being programmed incorrectly or even “forgetting” what they are supposed to do and when they are supposed to do it. This is a potentially significant problem for system controls that are time or date sensitive as the year 2000 approaches.

Properly operating and maintaining refrigeration equipment and controls is the best way to reduce the probability of spoilage. However, if a problem does occur, the two key elements of controlling the situation are simple ones. You have to know what is happening when it is happening, and you have to do something about it quickly.

How Do I Know If Something Is Wrong?

You can not do something about a potential spoilage problem if you do not know it is happening.

Timely detection and notification of refrigeration loss is the first thing that must occur. A good detection and notification system should have the following at a minimum.

1. A reliable method of continuously monitoring the temperature within the refrigerated space. This method should be tamper resistant.
2. Alarm points appropriately based on the documented requirements of the items being refrigerated and set to generate an alarm whenever conditions indicate loss or substantial reduction of refrigeration, but well before spoilage might occur. The alarm points should exhibit fail safe operation. In other words, complete loss of electrical power should create a refrigeration loss alarm.
3. The system should minimize false alarms. Devices such as a defrost cycle delay timer can prevent alarms being generated during normal operating conditions.
4. You must have a reliable method for observation of an alarm. The sophistication of this system should be dependent upon the value of what you have refrigerated. It may be as simple as a single point set temperature sensor with a simple red light and a single dial out notification alarm. It might be a very sophisticated multiple point multiple range continuous temperature monitoring system that is manned 24 hours a day, seven days a week.

5. The detection and alarm system should be tested at least monthly, and the results logged for future reference.
6. A written and practiced procedure should be in place for responding to the alarm. This is known as pre-emergency planning.

Pre-Emergency Planning — It Could Save Your Bacon

Once you detect the potential spoilage situation, you often have little time to respond. The most rapid response can occur if you already have a proper pre-emergency plan in place. Ask yourself, “What would I need to do if ...?” It is far better to think through and document your response well in advance of an emergency situation than try to remember everything to do and how to do it during an emergency.

A good pre-emergency plan is a document that includes a few basic elements that can easily be planned well in advance of a refrigeration problem:

1. Specific responsibilities are delegated to specific persons.
2. How to determine if the alarm truly reflects a loss of refrigeration situation.
3. Detailed steps to be followed to reduce the probability of spoilage.
4. Specific names and numbers of key contractors, equipment suppliers, refrigerated truck sources and/or alternate cold storage facilities, and insurance company contacts.
5. Specific steps for salvage, reclamation or disposal of goods if it should become necessary.
6. Periodic review and update of the pre-emergency plan.

The Bottom Line If you become aware that a refrigeration problem exists, prevention of spoilage might be as simple as making sure the door to the refrigerated space is not opened until electrical service is restored. It might require more stringent measures such as having access to self contained refrigerated trucks to store the products during a power outage or while equipment is being repaired or replaced.

In any event, if appropriate detection, notification, and pre-emergency planning has been developed, documented, and is frequently tested, spoilage is much less likely to occur.

[Editor’s Note: This article is not meant to be exhaustive or complete, nor is it intended to replace information or instructions from your equipment vendor.]

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