EPIC FAIL

FIGURE 1

FIGURE 2

VALVE MAINTENANCE

Valve maintenance has been a sore subject to a lot of folks in our industry for a long time. As early as 1993, Bulletin 110 (B110), "Start-up, Inspection, and Maintenance of Ammonia Mechanical Refrigeration System," from the International Institute of Ammonia Refrigeration (IIAR), called for valves with exposed stems to be inspected every six months during which the stem was to be cleaned, re-greased, and the valve moved off of backseat to determine if the gland was leaking. If leakage was found, the packing nut was to be tightened to stop the leak. If the leak was unable to be stopped in this manner, then the packing was to be replaced.

Think about that. The average system has anywhere from 250-750 valves. Some systems have thousands of valves. If we estimate that, at a minimum, it takes five minutes to perform the above mentioned service, then it will take between 21 and 63 hours to service the 250-750 valves every six months. This does not begin to take into account the time needed to access each valve. This, of course, should only be another 5 minutes per valve, because all of our valves are easily accessible for service. Right, everyone?

A lot of people in our industry have viewed B110 as mere guidelines, and stated that they do not need to be followed. Maybe this is true, but if valves are not maintained properly, they run the risk of looking like the ones in Figures 1 and 2. Figure 1 was the isolation valve on a high pressure liquid line to a 25 degree freezer for orange juice concentrate. Thankfully, it was found and replaced before it was needed. However, it should never have been allowed to have gotten in that state to begin with. (I can say that because it was at my plant, and I was just as guilty as most in letting the valve maintenance slide.)

Figure 2 shows another valve that, at the time the photo was taken it was an active isolation valve for a chiller. Again, thankfully, it was discovered and replaced before it was needed, but again it should never have gotten to that state to begin with (No, this one was not in my plant.)

B110 goes on to say that all shut off valves should be tested every five years for function. How does one do this? It is done by closing the valves to be tested ensuring that they hold. Usually, this is only accomplished by pumping down a section of the system on either side of the valve and seeing if it builds pressure. Now, I am sure that everyone has the capability of shutting down their system at will to pump sections out to see if the valves hold, right? This is another one that was often viewed as a mere guideline.

Thankfully, Standard 6 from IIAR, which is entitled, Standard for Inspection, Testing, and Maintenance for Closed Circuit Ammonia Refrigeration Systems, offers some relief in this area. If we look to chapter 11, the following testing/maintenance items are required for shut off valves.

1. Functionally test system emergency shut off valves every 5 years.
2. Exercise and lubricate system emergency shut off valves annually.

3. Exercise and lubricate non-emergency shut off valves every 5 years.

What is a system emergency shut off valve, you ask? They are valves that would be used to shut down the SYSTEM in an emergency. They are defined by each facility based on the configuration of their particular system. For instance, in a certain plant, you may have a main manual king valve on the high pressure liquid supply line, a main hot gas defrost shutoff valve, and a main recirculated liquid supply valve. These three valves would likely be defined as SYSTEM emergency shutoff valves. They would need to be identified with signage (in addition to valve tagging), and called out specifically on schematics available to first responders. These three valves would need to be exercised and lubricated annually and tested for function every five years. All of the other valves in the system can be exercised and lubricated every five years. This still takes some effort, but it is a much easier to complete it in the timeframe required.

Let's say that you have 750 isolation valves in your facility. That means that 150 valves per year would need to be exercised and lubricated, translating to 13 valves per month. This is roughly the equivalent to the valve banks on 1-2 evaporators (depending on their configuration).

So, with the replacement of B110 with IIAR6, required valve maintenance, while still requiring some effort to conduct, is much easier to accomplish. This ensures that the valves will function correctly and safely when the facility is called upon to use them. This is particularly critical if it is needed to stop a leak elsewhere in the system.

Staying on top of your valve maintenance will also help you to avoid costly regulatory fines due to failure to comply with the Mechanical Integrity element of the Process Safety Management regulations found in 29 CFR 1910.119(j).

If you have photos of an Epic Fail please pass them on to nh3isB2L@gmail.com.

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