ICE BUILD UP

The subject of this edition of Epic Fails is excessive ice buildup. This is a topic that is frequently discussed (some would say argued). I personally have seen a regulatory inspector freak out, to use the colloquial term, over a thin layer of frost on a product tank surge drum. I think that few who actually work in our industry would think that that would be excessive.

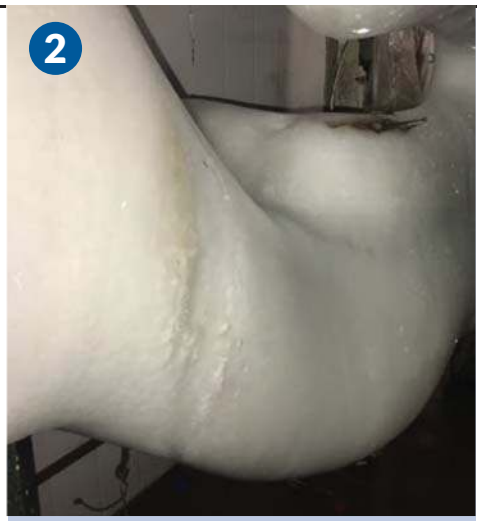
This topic has been so heated over the years that the International Institute of Ammonia Refrigeration, in their Standard 6, which covers inspection, testing, and maintenance of closed circuit ammonia refrigeration systems, took pains to provide some parameters around ice buildup. Section 5.6.8 of IIAR 6 states:

5.6.8 *Equipment and piping shall be kept free from excessive ice buildup.

> 5.6.8.1 Ice buildup shall not interfere with the operation of emergency shut-off valves.
>
> 5.6.8.2 Ice accumulation shall not be permitted to deflect or bend pipes, displace components, or negatively impact the system's structural integrity.

So let's look at some examples of what could be construed as excessive ice buildup. Do you recognize what is shown in the first picture, shown bellow? It is a view into an evaporative condenser that is completely frozen over. This occurred during the fall in a northern state. Each time that the facility attempted to turn the water off, the discharge pressure would jump up and they turned the water back on. The reason for the jump in pressure was not properly investigated until the airflow became so choked that the system could no longer be run without risking a release. When the first drift eliminator was removed, the airflow through the opening was so strong that it pulled a person's hard hat off. Now some might argue that this ice buildup might not meet the criteria spelled out in IIAR 6 for excessive ice buildup, but without true engineering calculations, how can we disprove that this ice buildup negatively impacted the structural integrity of the condenser?

I am told that this second photo is of a recirculation pump. I can attest that the piping going into the ball of ice did come from a vessel that could be considered a Recirculator, but I can also tell you that you couldn't prove it by me that there was indeed a pump under that ice. Needless to say, there is also no way that that pump could be isolated in the event of an emergency.



In the third photo, you can at least see the pump in question, but the isolation valve would be difficult, at best, to operate in an emergency.

The next two photos provide some clear examples where the ice buildup interferes with the operation of emergency shut off valves.

Finally, the last photo represents ice buildup that borders on being an imminent threat. As the ice buildup envelopes that small bore piping and valves on the oil pot, it will begin the bend and deflect them, potentially causing a catastrophic release of ammonia.

IIAR 6 does state in the informative appendix that:

The owner is permitted to develop and incorporate defrost operational procedures, ice removal procedures using mechanical tools, or both, with determined frequencies to safely remove ice often enough to avoid excess accumulation.

Bear this in mind when developing your inspections for your system's mechanical integrity program. Always be mindful of the potential consequences of ice buildup, particularly if it is allowed to continue for an extended period of time.

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

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