

## NOW WHO WAS SUPPOSED TO CHECK THAT?

By Bill Lape, SCS Engineers

A couple of months ago, a contractor with whom I frequently do business showed me the valve shown to the right. At first glance, it appeared to be a standard gauge/drain valve. However, once I removed the seal cap, it was obvious that something was amiss. Photo #2 provides evidence of that.

So, I asked the contractor, "What's the deal? Why is the bonnet assembly missing from this valve?" He replied, "That is a really good question. We found that on a section of a system that was being pumped down for maintenance after having been in service for a short period of time."

I said, "You're joking. This was in a live system? I don't believe it."

He then showed me Photo #3.

Could this have been staged? Sure it could have. Do I trust this contractor? Maybe not if he is buying me drinks, but when it comes to their service work, yes.

So, let's look at how this is an Epic Fail.

First, let's start with the Code of Federal Regulations. Both OSHA's Process Safety Management (PSM) regulations, found in 29 CFR 1910.119, and EPA's Chemical



Accident Prevention Provisions, or RMP, found in 40 CFR Part 68, contain sections pertaining to the conduct of Pre-Startup Safety Reviews (PSSR). Both regulations state, in essence, that when modifying a covered process, such as our ammonia refrigeration system, a PSSR is required when the change is significant enough to require a change to the Process Safety Information of the system. The regulations go on to state that the PSSR will, prior to the introduction of ammonia into that section of the process, confirm that the construction (of the change) and the equipment (installed or modified during the change) has been in accordance with the design specifications. The regulations further state that safety, operating, maintenance, and emergency procedures are in place and are adequate.

Let's address the procedures first. One of the requirements under both regulations is the development of operating procedures that includes, among other things, steps required for Initial Startup or the equipment. Most facilities that developed their operating procedures after the installation of the equipment state something along the lines of, "The specific initial startup procedures used when commissioning equipment are not contained in this document. These procedures will be developed on a case-by-case basis following industry (IIAR) guidelines and using the pre-startup safety review procedures." These operating procedures then lead into the steps for a Normal Startup, which are the steps to take if the equipment has simply been shut down when it has not been needed. This Normal Startup "phase" omits any commissioning steps. While this is fine for existing equipment, when we are expanding our system or replacing old equipment with new equipment, we must include the commissioning steps either in the Initial Startup "phase" of

the operating procedure or refer to them in the operating procedure and develop these checklists independently as part of the PSSR.

For instance, the commissioning steps of an evaporator would include, but not be limited to: Bumping the evaporator motors to check rotation; Calibrating the RTD being used to measure the room temperature; Tuning the control loop that controls a motorized expansion valve; Check to make sure that all drain valves are CLOSED AND PLUGGED; Pressure Testing it per ASME B31.5; and Leak Testing it per ASME B31.5. In the case of this valve, the unit was likely not pressure tested in accordance with ASME B31.5. If it was, then my hat is off to the valve manufacturer for making one strong plastic cap. So PSSR failure #1 is a lack of proper commissioning steps in the procedures.

Regarding the ensuring that the construction and equipment meets design specifications, if the project is conceived and implemented without thorough, clearly written design specifications, then what do we have to check the construction and equipment against? Clearly, a sketch on a cocktail napkin isn't going to cut it. If you don't have a design specification, then we have to look to Recognized and Generally Accepted Good Engineering Practice. This starts with the model codes, as adopted at the state or local level. These would be building, fire, mechanical, plumbing, and electrical codes. Then we have to look at the consensus standards that are adopted by the model codes. Examples of these consensus standards include IIAR2, the Standard for the Safe Design of Closed-Circuit Ammonia Refrigeration Systems, or ASME B31.5, the Refrigeration Piping and Heat Transfer Components Code. IIAR4, the Standard for Installation of Closed-Circuit Ammonia Refrigeration Systems, and IIAR5, the Standard for Start-up of



Closed-Circuit Ammonia Refrigeration Systems, are also examples of consensus standards with which we must be familiar. PSSR failure #2 is a lack of a design specification, but, more importantly, also a lack of knowledge of the codes and standards upon which a design specification would be based.

A Pre-Startup Safety Review is essential to help prevent a catastrophic release of ammonia from our systems. Finding personnel with the required knowledge and giving them time to thoroughly review the system modifications will help to keep your employees, your contractors, and possibly the public, safe.

If you have pictures of some Epic Fails from your "Brother-in-law's" facility, please send them to NH3isB2L@gmail.com.

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