Accident Involving Hot Water

There's a big difference in checking to see if everything is ready than in checking to see if anything can go wrong.

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Many of the papers presented at this symposium are those dealing with major accidents or problem areas in the specific designation of ammonia plant or plant of a similar nature. While these are appropriate subjects to be covered in this meeting, this symposium was initiated to report and find solutions to problems related to air and ammonia plant safety, and we should give some attention to areas involving safety in these plants. I do not advocate that we should reduce our emphasis on the more spectacular areas of ammonia plant safety such as reformer tube life, explosions, equipment failures, etc., but it is sometimes hard to determine what is safety and what is loss prevention. We should give some time and some thought to the routine day-by-day activities that can result in our people getting hurt. We sometimes emphasize our equipment protection and our production protection and we tend to overlook our people protection. This paper is presented to illustrate how this people protection can sometimes be voided even though following normal procedures.

The Borger Ammonia Plant had been shut down on the 11th of the month, and the repairs requiring the plant to be shut down had been completed. On the 15th, while the plant was in start-up, two maintenance men were assigned to replace the packing in the steam heated MEA reboiler. This reboiler has lean MEA on the tube side, with 50 lb. steam entering the steam chest at the top on the shell side. The condensate line leaves the steam chest near the bottom, rises several feet and passes on to the condensate collection header. The lower portion of the tube bundle has a floating head connection which passes through the steam chest outer bottom head through this afore-mentioned packed joint. The two maintenance men contacted the operations supervisor for a work permit before working on the reboiler.

The inlet steam block valve to this reboiler had been closed at the time of the shut down and all of the condensate valves blocked and the reboiler steamside drained. The supervisor checked that the steam valve was still closed, and had some operators pull down on the valve to verify that it was closed. The drain was checked and was found to still be open, as was the vent on the steam chest. The maintenance men donned protective equipment and set up a scaffold so that they could work at the packing gland without any risk of strain or fall. They loosened the nuts holding the packing gland in place, and knocked the gland follower down with a tool. When this happened, about 50 gallons of boiling hot water suddenly rushed out on them, drenching one of them thoroughly and lightly splattering the other one. Both jumped to the ground and nearby workers stripped their clothes off and washed them with cold water. The worker who had received the brunt of the hot water suffered second and third degree burns over his face, upper torso and arms. The other maintenance man was not burned and returned to work. The injured man lost 26 days of work as a result of this accident.

The investigation following the accident revealed that the steam block valve was leaking a small amount of steam, even though it was closed. This leakage was not sufficient to develop any pressure on the steam chest, but did accumulate hot water in the floating head shell immediately above the packing joint, just below the condensate outlet. The open drain permitted any excess accumulation of water to be drawn off so as to give the appearance that the exchanger was empty. To eliminate this problem, a small drain has been installed on the floating head shell immediately adjacent to the packing joint, so that any water accumulations may be drained before the packing joint is loosened.

This incident has a loud, clear message that tells us that there is a big difference between checking a piece of equipment to see if everything is ready, or checking it to see if anything can possibly go wrong. The extra amount of time it takes to eliminate every possibility of an accident is a small price to pay to save your people from pain, anxiety, or worse. This may be the result, if you don't heed the message. #

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