Journal of Loss Prevention in the Process Industries 25 (2012) 770–774

Contents lists available at SciVerse ScienceDirect

Journal of Loss Prevention in the Process Industries

journal homepage: www.elsevier.com/locate/jlp

A tribute to Trevor Kletz: What we are doing and why we are doing it

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ARTICLE INFO

Article history:
Received 4 December 2011
Accepted 20 March 2012

Keywords:
Process hazards
Risk reduction
Incident investigation
Inherent safety

ABSTRACT

The goal of my tribute to Trevor Kletz is to show a view of his overall influence on many of the elements of process safety: how he helped establish a strong foundation on which we are building our future process safety risk reduction efforts.

1. Prologue – the dwarves meet the giants

Sir Isaac Newton (1675) wrote, "If I have seen a little further it is by standing on the shoulders of Giants." Its Latin origin, first recorded in the twelfth century by Bernard of Chartres (ca. 1120, 2008), is "Dwarfs standing on the shoulders of giants (*nanos gigantium humeris insidentes*)." In 2012, we pay tribute to one of the giants in the process safety field, Trevor Kletz, as we celebrate his 90th Birthday. I hope that my thoughts provide you, the reader, with yet another perspective on how his enthusiasm and desire to make this world a better and safer place still encourages us to do the same today.

My paper's title derives from a table entitled "What I Did and Why I Did It" in his autobiography (Kletz, 2000). My tribute and reflection focuses on updating this title from the past tense to the future tense. I hope that what I convey in this tribute helps show that we must:

1. remember and understand our past,
2. recognize our present state (what we are doing today), and
3. anticipate our future state (where we may be going).

We are doing what we are doing because of what Kletz and many other giants have done before us, and we continue on our journey with their encouragement today.

2. Our history – the dwarves forget to remember

Our process safety risk reduction journey has been filled with significant incidents that have caused fatalities, damaged the environment and destroyed plants. Kletz discovered that through a combination of errors in design, fabrication, installation, operation or maintenance, many things went wrong when managing chemical hazards. He asked over and over, "What went wrong?" He investigated process plant disasters, discovered how they could have been avoided and then shared his findings with us (Kletz, 2009). He learned that many of the fires and explosions resulted from the loss of containment of hazardous materials and energies. And he shared with us that "what you don't have can't leak," helping establish the concepts and technologies of inherently safer design (Kletz & Amyotte, 2010).

With his permission, I have rearranged his "What I Did and Why I Did It" table's themes into two tables (Table 1, before 2000; Table 2, after 2000), with some of the basic elements of our process safety risk reduction efforts listed in the rows. I added columns representing the year that his books were issued and mapped these subjects with each element, as well (the list of his work is shown in Table 3). Although I have not read all of his publications, I do hope that my "Total Element Count" shown in Table 2 helps provide an overall view of his insights across these process safety elements.

In the decade since Kletz shared with us what he did and why he did it, we have seen history repeat with more fatalities, environmental damage and business upsets due to fires, explosions, and toxic releases. For this reason, Kletz (2009) added with a tone of sadness several new case studies, re-emphasizing that things are still going wrong – that incidents keep repeating because we do not share our experiences or we forget our learnings. As shown in Table 2, the studies and discussions in his 2009 book cover to some extent everyone of the process safety elements. And as George Santayana (1905) wrote, "Those who cannot remember the past are condemned to repeat it."

Based on the count shown in Table 2, I hope that the following statement helps portrays one element of Trevor Kletz: an investigator

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doi:10.1016/j.jlp.2012.03.006

Table 1
A historical view of Trevor Kletz's works before 2000.

Process Safety Risk Reduction Element		"What I Did"	Year											Element "Count" by 2000
			1984	1989	1990	1991	1993	1994	1995	1996	1998	1998	1999	
01	Technology	Inherently safer design	1			4					9			3
02	Hazards and Risks	Hazop							7				11	2
		Hazan												1
03	Changes	Control of modifications										10		1
04	Handovers	Preparation for maintenance												1
05	Integrity and Reliability													1
06	Procedures													1
07	Contractors													
08	Emergencies													
09	Training													
10	Audits	Audits and inspections												
11	Investigations	Better investigations of accidents						6				10		2
		A new attitude of human error												
		Accident case histories										10		1
		Better publicity for accident reports												
12	Discipline	Better ways of remembering the lessons of the past					5					10		2
13	Leadership	Myths of the chemical industry		2	3					8				3

who continues to spend his time looking for causes, analyzing for hazards, reducing risks, and proposing better technologies to reduce process safety risks. Part of his conclusion is for us to be able to create, implement and maintain risk management systems with discipline from everyone in the organization, from top to bottom: managers, engineers, purchasers, supervisors, operators, mechanics, and electricians. He understands that discipline is required by all levels of leadership.

3. Our future – the dwarves as spiders on the web

Our process safety journey continues. Since our dwarf wishes for a better view, I envision him climbing a "Process Safety Skyscraper" for his future perch. The process safety elements/Kletz Themes list in Table 2 are inverted in Fig. 1, with each of the process safety elements noted as the Process Safety Skyscraper's floors.

As is shown in Fig. 1, the Global Process Safety Skyscraper is built on solid ground. Since we must have adequate understanding of the hazards of the materials, the design of the process and the design of the equipment before we can build the floors above, we must have a strong foundation – the Technology floor. The Skyscraper's different elevators help communicate information between each floor (each element). However, note that the Design, Apply, and Learn elevators do not reach every floor. The first three floors are linked with the Design Elevator, floors 8 through 11 use the Learn Elevator and the floors in between 3 and 8 use the Apply Elevator.