What and How to newly apply for Process Safety total Management (PSTM) in the Complex Chemical Plants?

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YoungHo Kim
Y.H.KIM Engineering & Manufacturing Consultant
Seoul, Korea
E-mail: yhkim1116@hotmail.com

I. INTRODUCTION

● The purpose of this research is: To prevent both any accidents and its recurrences through the Process Safety Total Management (PSTM), and also minimize losses of lives and National Properties.
● The philosophy of this research is: On the basis of both Engineering Ethics and Beliefs in Experiences.
● Author shows: What and how to newly apply for Process Safety Total Management (PSTM).
● This research answers: The Research Questions asked on the below.

I.1. Research Purpose:
● By sharing Author’s knowledge and technologies on the hands-on experiences, Research Purpose is to prevent both any accidents and its recurrences in the complex chemical plants through the PSTM, and also to contribute community and society by minimizing losses thru the PSTM.
● Research Questions:
   Firstly, what is the main root cause that raises process troubles?
   Secondly, what should they do manage to investigate and solve this main root cause?
   Thirdly, what kinds of managing tools should they utilize for successful PSTM?

I.2. Philosophy of Process Safety
   Process Safety is the same priority as production, quality, cost, morale, and family’s happiness.
   CEOs and Chairmen will insure safe and healthful working conditions for all employees through the fulfillment of excellent PSTM. The goal of safety is to approach zero accidents in their total job site.

Figure 1. YHK’s Philosophic Criteria Triangle Diagram on Safety Philosophy. This figure shows the relationship between the three Categories of Philosophies and the Philosophic Criteria. (Where, YHK is initial letter of Author’s Name, YoungHo Kim)

I.3. Culture of Process Safety
   Company is necessary to establish their own Culture of Process Safety for the approach of their Goal of Process Safety. They are desirable to answer the following questions on the Culture of Process Safety in their circumstances.

Questions on the Culture of Process Safety:
   Firstly, what does Culture of Process Safety create?
   Secondly, what does the Culture of Process Safety say and show in their philosophic mind?:
   What for the Managing Philosophy?
   What for the R&D Engineering Philosophy?
   What for the On the Job Philosophy?
IV.3. Management Tools for PSTM Application
For the third question of “what kinds of managing tools should they utilize for successful PSTM?”, it is answered to the necessarily-required 50 of “Management Tools for PSTM Application”. And it is shown on the following Examples:
1) Corrosion and erosion allowance management, 2) Code, standard, and regulation management, 3) MSDS and CSDS management, 4) Safety allowance management, 5) QC and QA, etc.

V. CONCLUSIONS
In this research, the three categories of Research Questions of Research Purpose were answered by showing required solutions and countermeasures through Methodology and Discussion.

Conclusion: Firstly, the Human Error calling main root cause in the management of Process Safety should thoroughly analyze and minimize. Secondly, they should consider and make a decision for 10 Essential Groups to be successfully managed and continuously study to find out both 21 Essential Elements and 296 Essential Managing Cores attached to those Essential Elements. Thirdly, necessarily-required 50 kinds of the Management Tools for PSTM Application mentioned above should be utilized and exactly executed for leading of perfect PSTM.

Suggestions: Author suggests the followings so that these requirements of Management Tools can be fulfilled on time for perfect PSTM:
They should immediately follow these requirements of Management Tools timely as soon as they face up with any troubles, situations, and accidents, etc. And CEOs and Top Managing Groups’ Directors should confirm whether or not they do sustainably perform the whole activities of the PSTM to protect lives and national properties from any accidents, and also periodically manage both auditing and evaluating for the successful PSTM.

REFERENCES
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III. RESULTS

The results are accessed on the basis of the Informal Education thru Author’s both hands-on experiences and international consultations shown on the above Figure 2, which has performed through safety audit and evaluation on the PSTM, from various fields of chemical processes and complex chemical plants. Consequently, based on the Informal Education the followings are resulted in this research. Basically, as shown on the below “IV.2, Essential Groups and its Analysis to be overall managed for PSTM”, is composed of 10 Essential Groups to find out the Essential Elements. And, the 10 Essential Groups are classified with 21 Essential Elements. And more the 21 Essential Elements contain 296 Essential Managing Cores to be practically applied for the PSTM. Moreover, for essential application of this research, it is researched that necessarily-required 50 kinds of the Management Tools for PSTM Application. These results are represented a process of perfect PSTM as shown on the below Figure 3, YHK’s Tree Diagram for Perfect PSTM.

IV. DISCUSSION

IV.1. Human Errors

For the first question of “what is the main root cause that raises process troubles?” It is answered to Human Errors. And it is discussed on the following:

What is happening and developing from the “Human Errors”? The following serious calamities: 1) Risks, 2) Accidents, 3) Catastrophes, 4) Disasters are caused by human errors.

How to grow and develop Risk management for the worst possible situations? Because risks are the new buds for disasters, which are an industrial enemy in the line of the Industrial Battle, we should try to nip in the bud, to cut away the new buds in early stage.

IV.2. Essential Groups and its Analysis to be overall managed for PSTM

For the second question of “what should they do manage to investigate and solve this main root cause?”, it is answered to “Essential Groups and its Analysis to be overall managed for PSTM”. And it is discussed on the following:

The Essential Groups are classified with 10 areas as shown on the below:

The YHK’s 10 Essential Groups are composed with 21 Essential Elements and 296 Managing Cores of PSTM as studied on the below.
I.4. Background of Research
This research is studied on the basis of the Informal Education thru Author’s hands-on Experiences. The following block diagram, Figure 2 represents Author’s Background on hands-on experiences.

**Figure 2. Background Diagram of Research.**
Based on the Informal Education thru Author’s both Hands-on Experiences and International Consultations. This flow chart shows Author’s working and consulting process.

II. METHODOLOGY
- Firstly this research analyzes human errors that are root causes of whole Process Safety.
- Continuously, analyzes and composes Essential Groups to be overall managed in details for PSTM.
- Classified with Essential Elements.
- Contains Essential Managing Cores for practical performance of PSTM.
- It is searched for the Essential Groups that should necessarily manage to select.
- And those Essential Elements supporting Essential Groups are classified with necessarily required fields.
- And the Essential Elements are focused to find out Essential Managing Cores that should thoroughly manage in details.
- Finally, the PSTM searches required Management Tools for its successful Application.