SLP SOCIETY of LOSS PREVENTION news
In the Oil, Chemical & Process Industries (Singapore)
FEB 2005
MITA NO.: 260/06/2004

Behavioral Based Safety

Safety professionals have over the years made significant progress in improving the safety performance of the industries in which they work. This progress has been due to a combination of regulatory requirements, advances in technology, training and education of all levels of employees, and a determination by boards of management and managers to make an improvement. Regulations have usually been introduced as a reaction to some incident. They set minimum standards and do not or have little influence on determining the significant step changes in safety performance. They only go so far. Advances in technology and in the design of plants have made a significant difference. In the last twenty years or so we have heard more and more about Inherently Safer Design. This is an idea that has been borrowed from the Quality Improvement movement. A famous quote from this way of thinking is, "What is not there, can't leak". Imagine the savings in investment, plant running costs and the accidents that would never happen because the offending material is not there in the first place. This would be ideal and an idea that must be seriously considered whenever we have an opportunity to build a new plant or to modify an existing one. What about the more immediate concerns of people who have to run a plant that has already been built. Boards of management and senior managers must want to make the commitment to improve and significantly. So they must "walk the talk" and they must establish SHE Management Systems. The rigorous implementation of these systems have produced significant improvements in safety performance. And these investments in safety improvement have paid good dividends. It has to be good business to improve safety performance or managements would not be interested.

Even organizations with exemplary safety, health and environmental performance have come to a point where it is difficult to improve further. Alas, the stumbling block is man himself. Human beings are inherently error prone. But to blame accidents to human error is to dodge the real root cause. Much more has to be done before human error is identified as the root cause.

Fortunately, for all SHE practitioners, much has been learned about human behavior. Psychologists have studied a person's perception of risk and the resulting behavior. Psychologists have also studied the effect of reward (positive stroking) and punishment (negative stroking) on a person's behavior. The field of behavioral based safety (BBS) has grown very rapidly in the last few years. The belief is that safety performance can only move to the next (better) level by the application of good psychological principles.

Richard Gillis explaining a point

Cheng Pheng and two other members sharing some insights before the start of the talk

The discussion must be profound -- everyone is so serious

Mr Seow Min Fook, a former employee of ExxonMobil, who had played a significant role in the roll out of BBS in ExxonMobil Chemical in Singapore, presented a technical talk to SLP members on Nov.17.2004. His talk was entitled "Implementation of BBS – Development, Experience and Challenges to Improved Safety". He shared his experience starting from 2000 in the implementation of BBS in the petro-chemical industry and even a company in the construction industry. He and his psychologist colleague based their Singapore implementation model on the experience of USA and Europe. Although the psychological principles were the same, they found that they had to make modifications to the approach to suit the Singapore environment and culture eg. Singaporeans are less outspoken than their US and European counterparts.

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EDITORIAL

2005 seems to be flying by even faster than the previous year. Chinese New Year has come and gone. We are not too late to send our Chinese friends a wish for a Happy, Healthy and Safe Year of the Rooster.

This year is going to be a very active and busy one for SLP because we are organizing a two-day conference on September 21 and 22, 2005. The theme of the conference is, “New Initiatives in Loss Prevention”. Our purpose is to stimulate attendees to look at and think about our safety, health and environmental issues in a new light. Even if we don’t fully succeed in this, we believe that the authors would leave you with some ideas that would be immediately useful to you. The authors are very experienced and practical persons. You will be seeing and hearing more about our conference in succeeding issues of this publication. We will also be sending you separate announcements on it. Members and readers in general should mark their calendars and make it a point to attend the conference and workshops.

SLP now has an agreement to jointly conduct training sessions with the Singapore Chapter of the Institution of Chemical Engineers. I Chem E is providing training materials from its headquarters in Britain. SLP is providing the administrative support. The courses are open to members of I Chem E and SLP and to other persons who are interested in Loss Prevention in relation to Safety, Industrial Hygiene/Health and Environmental Protection. Our course leader is Mr John Lockwood who needs no introduction in Loss Prevention circles. Attendees at his courses will have a chance to interact with him and gain some valuable insights into Safety issues. The first course is on Job Safety Assessment. It is targeted at line managers and supervisors who are responsible for safe operations and who are involved in the preparation and issuance of work permits. The one-day course is set for May 18. You will soon be receiving more details on this subject.

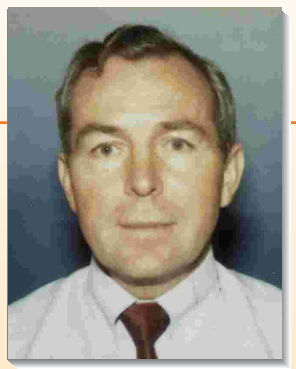
Readers would have seen the announcement about our Annual Members’ Night. For those of you who did not attend the celebration in 2004, you have a chance to find out what you missed last year. You need to **book early**. Our celebration for 2005 is on April 16. **Mark your calendars. It’s an event not to be missed.**

We have technical talks already lined up for March, May, June and July and a plant visit in April.

You can see we have a very busy and interesting year ahead.

Our President has again written a very insightful letter. It behooves us to use our best judgement at all times and not overly rely on computer software to solve all our control problems. We must understand what we are doing!

PRESIDENT'S MESSAGE



Against the background of the recent publication of the NASA Columbia Space Shuttle investigation report and the 20th anniversary of Bhopal I have recently been involved in professional development training and auditing. This has led me to think more deeply about system safety, as the failure of the safety management systems is a root cause in these incidents and many other incidents.

The traditional approaches to safety management are necessary but insufficient. For example the classic approach of energy sources and barriers addresses the risk management of energy sources but does not provide insight into broader safety management systems issues. Often incident investigation processes look for fault and frequently blame the victim. Unfortunately these approaches do not address the root causes of many incidents. They do not identify failures of the safety management systems.

In my search for information I came across several interesting sources.

Firstly from the Massachusetts Institute of Technology. MIT is publishing its course materials under the MIT Open Courseware program (http://ocw.mit.edu) to make such materials freely available on the web for all to use. One of these courses is by Professor Nancy Leveson titled "System Safety" (http://ocw.mit.edu/OcwWeb/Aeronautics-and-Astronautics/16-358JSystem-SafetySpring2003/CourseHome/). I found this course very interesting. However the real strength of the course is not in the PowerPoint slides, as these are only memory props for the lecturer. The real strength of the course is that Professor Leveson has the draft of her next book "A New Approach to System Safety Engineering" on the website. I found this excellent reading. So much so I bought her earlier book "Safeware: System Safety and Computers".

In her books Leveson develops the concept of systems safety. In particular she addresses the use of software as it is a poorly managed component in our safety management systems. We can predict failures of plant equipment but we cannot predict software failures. Software uses a generic machine, the computer, to carry out its instructions. Unlike hardware, software does not wear out and fail in predictable ways. Most of our software systems are quite complex and cannot be guaranteed to be free of bugs. There are many examples of incidents related to safety management system failures in her books. They include several incidents from the chemical processing industry. Professor Leveson includes one incident, attributed to Trevor Kletz, where both the operator and the computer followed their instructions correctly, but an incident still happened.

Professor Leveson uses the term systems theory for the analyses and design of the whole as distinct from the parts. She believes that our plant systems are too complex for complete analysis and too disorganised for statistical analysis.

Professor Leveson analyses safety management systems using two ideas. The first is emergence and hierarchy. An emergent property arises when components of the system interact with each other within a larger environment. In the hierarchy, each level of the organisation is more complex than the one below. Some properties characteristic of a level are irreducible. The second idea is communication and control.

In the model of accidents used with systems theory, accidents arise from interactions among humans, machines, and the environment. Accidents are not simply a chain of events or linear causality. Accidents arise from more complex causal connections. Safety is enforced by a set of constraints related to the behavior of the components of the system. When appropriate constraints are lacking, or not managed, incidents will occur.

Many examples of serious computer software failures are available on the internet.

I found Professor Leveson's books very useful. She provides an analysis of our current safety management tools and suggests ways to manage safety, both software and organisational. I think you may also find her ideas useful.

Naturally, there had to be an implementation plan. The plan emphasized buy-in from all sections of the work force – from managers to operators. The plan relied heavily on an in-house implementation team. Training and education started with the management team first, then the implementation team and so on down the line until every person, including contractors, on the site was covered. Training and education covered the psychological principles and the application of these principles at the plant site. Trust had to be gained about he process because a large part of BBS implementation was an observation and intervention activity. For most companies, this would be a major shift in behavior. In the observation and intervention model, every person can be an observer and is encouraged to be one, not just supervisors and managers. BBS is not another inspection program. It is not enough just to observe, it is also necessary to intervene because as a slogan says, "I care for your safety". If every person at a plant site did this, what a powerful force this would be. Employees were involved in the design of the observation and intervention forms which employees (the observer) were required to complete. Simplicity is the rule for these. These completed forms (reports) are centrally collected eg. the Safety section and analyzed to determine the 5 Key Hot Spots. These would be the areas for follow up. Feedback is constantly provided to the whole plant organization. The system has to be open and transparent. Regular reports on the progress of BBS implementation would be generated for senior management. Improvements would be tracked. It is also recommended that an independent 3rd party be employed to regularly monitor the effectiveness of BBS implementation so that deviations may be corrected in a timely manner.

In order not to burden the organization with more work, BBS should be built around existing strengths eg. integrate BBS into the existing safety management system. For example, if there is already a regular plant walk around by managers, make this into an observation and intervention activity.

Speed of implementation is another key factor. After the training and education, BBS field implementation should be in place within 3 months. Keep up the momentum.

What are the obstacles to implementing BBS?

For BBS to work there must be a basic safety system already in place. A company with a poor safety performance needs to do all the foundation work eg sound technology, good design, a well trained work force and a working safety management system, before embarking on BBS. Since BBS represents a major change for most organizations, much attention must be paid to obtain buy-in from all levels of the company. BBS is not a magic bullet. Senior management support is a pre-requisite not only to provide the initial resources and leadership, this support is also necessary on a sustained basis. This can be a challenge because of the multitude of pressures on a manager. Care must also be taken to build up the trust level. People must feel free to make observations and to intervene without regard to company hierarchy.

Mr Seow finished the talk with a lively exchange of views with the audience. The usefulness of the talk was evidenced by the formal audience feedback which was very positive.

By Ngiam Tong Yuen

Min Fook in full flow -- he has such passion for BBS

The talk is under way -- the audience paying rapt attention

After the hard work, the reward -- Min Fook receiving his memento

See Hee making a point during the discussion

Bhopal -- 20th Anniversary Conference

Towards the end of 2004 people within the SHE world were attracted to an International Conference in Kanpur India to mark the 20th anniversary of the Bhopal Gas Release Disaster which without doubt was the worst accident in the history of the Chemical industry.

Although the world has since witnessed the tsunami disaster, this should not overshadow the seriousness of the Bhopal disaster and the lessons drawn from it because these lessons are still applicable in the world to-day, 20 years since the event of 1984.

The conference was organized by Prof. J.P. Gupta and his colleagues from IIT Kanpur. The speakers included prominent persons such as Prof. Sam Mannan from MKO USA, Ms. Carolyn Merrit, Chairman of CSB USA, Dennis Hendershot from Rhom and Haas USA and Chris Pietersen from TNO. Speakers came from 28 countries.

At the opening of the conference several new books were distributed. They were either written by people who were present at the incident or by people who took part in the incident investigations. These books help the reader to understand that a major cause of the accident was traceable to the weak safety culture at Union Carbide in Bhopal.

The Bhopal plant manufactured an insecticide called Cabaryl. An intermediate in the process was the very poisonous Methyl Isocyanate(MIC).This **intermediate** was stored in a 100-ton capacity tank. The storage of this toxic intermediate, let alone in such large quantities, was a serious error. This contributed to the scale of the incident and its tragic aftermath. At the time of the incident, one tank containing MIC became contaminated with water. This set off an exothermic reaction and the pressure build up caused a pressure relief valve to open and to release MIC. Multiple failures of the downstream safety system then occurred. For example, the scrubber, the refrigeration system and the flare stack did not function as expected. This contributed to the large release of MIC.

3000 people died immediately following the accident. Now 20 years later the figure has climbed to some 15000. About 200000 were injured. These figures do not reveal anything about the destructive effect on many families and the fabric of Bhopal society in the following years.

During the last 20 years many causes have been ascribed to the accident. However, it is more productive to concentrate on a few critical ones. The lessons from these have had a major effect on process safety and on how people have been educated and trained to prevent future accidents.

1. Safety culture. No safety precautions will prevent an accident if a safety culture that governs the behavior of management and workers is absent.. In Bhopal this basic building block was not present or was weak.

2. Safety management. These Safety Management Systems were not widely established in 1984 although some know how did exist at that time eg.DuPont PSM, Lord Cullen's recommendations from the Piper Alpha accident and CCPS procedures. Two big accidents in 1984 (Bhopal and the BLEVE in Mexico city) triggered in many locations the need for such an organized and systematic approach.

3. Inherently Safer Design. The application of the principles of Inherently Safer Design would lead to the best results. In Bhopal the root cause of the disaster was the nonessential storage of large quantities of MIC – the intermediate poison.

4. Accident information distribution. The Bhopal accident still provides valuable lessons after 20 years. As zero accidents or total inherent safety are still visions and accidents do occur we should encourage the call of Trevor Kletz in the special issue of LPB No. 100 " Why should we publish accident reports ? ".

In Kanpur one of the main speakers was Ms. Carolyn Merrit chairman of CSB, USA. From the data that she has in CSB, she is convinced of the wisdom of this approach.

In conclusion, while the tsunami disaster is still fresh in our minds, a point should be made that a basic thing like an emergency and evacuation plan would have saved many lives.

By Yigal Riezel -- an overseas member of SLP

Ministry recognition for SLP

The Occupational Safety Department (OSD) of the Ministry of Manpower has recognized SLP as a professional association under its Continuing Professional Development program for Registered Safety Officers.

As members, who are also RSO's, know an RSO requires a minimum of 40 SDU's (Safety Development Units) every two years to qualify for re-registration. The OSD has recognized SLP under Category A2 (a) and (b) of its guidelines. Category A 2 covers Participation in Professional Boards, committees and Societies.

Activity	Number of SDU's awarded
Member of SLP exco.	4
SLP member	2

Members will also recall that OSD recognized our training courses on Gas, Vapour and Dust Explosions, and Electrostatic Hazards held in September 2003. Attendees who successfully completed these courses received a total of14 PDU's.

We will be applying to OSD to recognize the course on Job Safety Analysis to be held on May 18, 2005. This course is to be conducted by Mr John Lockwood.

Similarly, we will do the same for our conference, New Initiatives in Loss Prevention, to be held on September 21 and 22, 2005.

It is our intention that OSD's recognition be obtained for all training courses, seminars, workshops and conferences that we organize.

Members who refer to the OSD guidelines on Continuing Professional Development will also note that participation in SLP's Technical Talks and Plant/site visits will earn SDU's under Category B 3.

We are naturally pleased with this recognition by OSD. Our members have, over the years, worked with OSD staff members in various committees eg. working committees of SPRING Singapore.

This recognition is a tangible "value add" to your membership in SLP. Members should therefore encourage their colleagues who are not yet members to join. Don't hesitate !

By Ngiam Tong Yuen

Members' Night is here again!

Members and friends, our Party of the Year is here again. So take out your social calendar and mark April 16 because this is the night when we will let our hair down, head for Jurong Country Club and party!

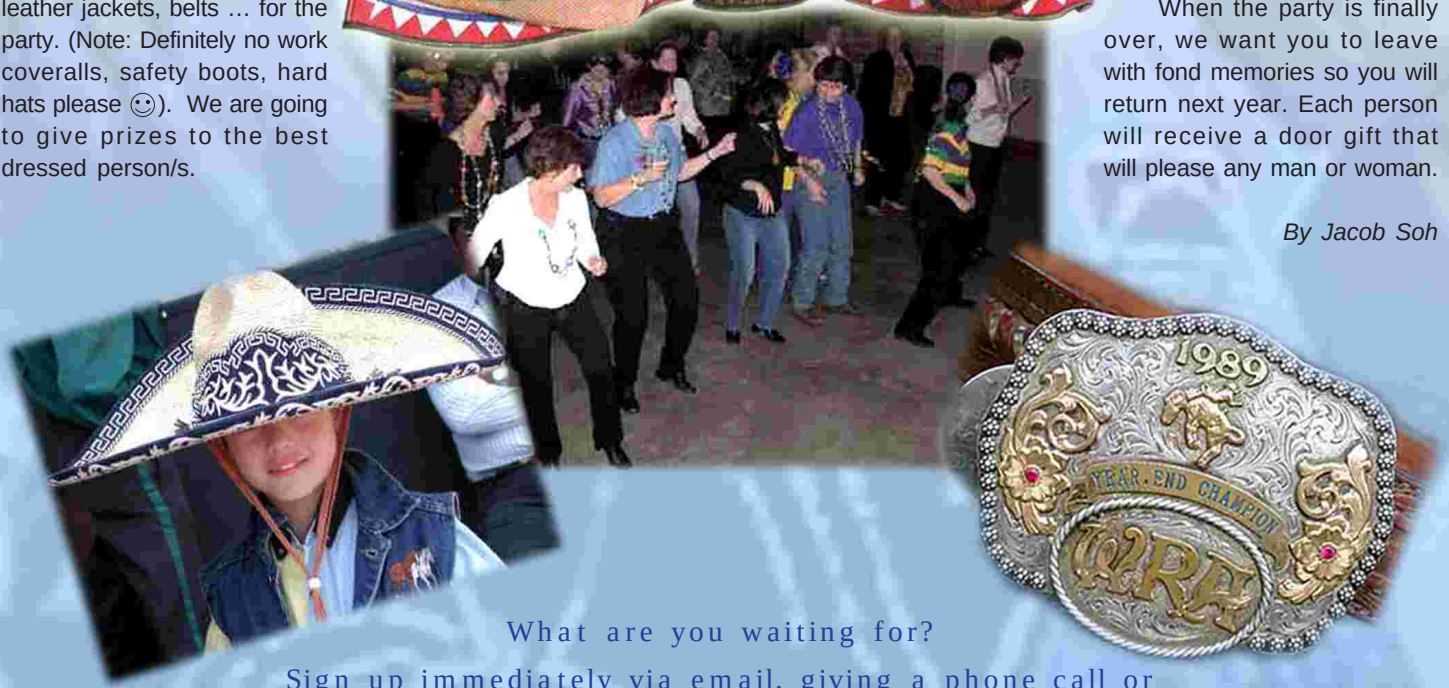
We are maintaining our tradition of not charging SLP members and their spouses or partners for the evening. If you are a nominee of a Corporate member, we are extending this privilege to your CEO / MD also. We hope you invite them. If you are bringing friends and associates, the charge is the usual $40 per person. We encourage you to invite your friends and associates for this hard to beat event.

What are we offering? Well how do you like a Country and Western theme. All you aspiring cowboys and cowpokes, here is your chance to show off your stuff to your admiring female fans. So don your denim jeans/jackets/ coveralls, cowboy boots, hats, leather jackets, belts ... for the party. (Note: Definitely no work coveralls, safety boots, hard hats please ☺). We are going to give prizes to the best dressed person/s.

To get you into the right mood, there will be friendly members welcoming you with cocktails. For the health conscious, there will be vegetable dips.

How about music? Of course, we will have a band to provide your favorite Country and Western music and other tunes that strike your fancy.

The dinner will have a Singapore twist – it will have a western and Chinese fusion menu. To whet your appetite, we are laying out loads of finger food like potato wedges, onion rings, chicken wings and spareribs. Hungry already? You need to sign up first and wait until April 16!



It will not be a party without fun and games and laughter. Indeed, we will have some original and creative games – not the current Singapore Idol fad. We promise a carefree and enjoyable evening. So hang loose and be part of the fun.

When the party is finally over, we want you to leave with fond memories so you will return next year. Each person will receive a door gift that will please any man or woman.

By Jacob Soh

What are you waiting for?

Sign up immediately via email, giving a phone call or just informing any of the SLP EXCO members.

The best contact is Lylian via her e-mail address at: secretariat@slp.org.sg.

Watch out for further announcements for details!

We look forward to seeing you all.

Program for 2005

Members will be pleased to know that we have a very interesting year ahead of us in 2005.

March 23
Talk by Mr. K H Harrington. Senior Process Safety Advisor, Chevron Phillips Chemical Company -- Incident Investigation – Pitfalls for Practitioners

April
Plant visit to GlaxoSmithKline -- Host Mr Alan Loh

May 18
One-day training course on Job Safety Analysis by Mr John Lockwood, International Refinery Services

May
Talk by Mr Gregory Poi, an SLP member and lecturer at Singapore Polytechnic -- Bio-remediation

June
Talk by Mr Michael Chua, Westfield IT and Security Asia Pacific – Cyberterrorism

June
Annual General Meeting of SLP

July
Talk by a speaker from Apac i-security -- Security Management for the Oil, Gas, Chemical and Process Industry

September 21 and 22
SLP 2-day Conference on New Initiatives in Loss Prevention

October
November
December
More to come

Members are invited to suggest activities for inclusion in our program. Typically these would be subjects that are of interest and/or concern to them and their colleagues in their professional and working lives. You will get the most value from your participation in SLP activities if you take a hand in structuring/designing them. The ball is in your court!

By Ngiam Tong Yuen

Welcome

We extend a warm welcome to:

Ordinary Members

Mr Gregory Poi
Gregory, a Malaysian, is a Lecturer at Singapore Polytechnic in the School of Chemical and Life Sciences. He teaches Environmental Studies, Industrial Biotechnology and Bioprocess Engineering. He is a graduate of the University of New South Wales in Sydney, Australia. He has a BSc in biochemistry and industrial microbiology (1983), a Graduate Diploma (1984) and a MSc in fermentation (1986). He worked for two years in Australia with MVRIC before coming to Singapore. He is active in R and D and consultancy in the bio-treatment of industrial wastewater and bio-remediation in Singapore and Indonesia. He has done training on SHE topics for several refineries and chemical plants.

We look forward to Gregory's participation at our activities and to his contributions to the development of SLP.

A Great Welcome to All.

We want to hear from you

The SLP Newsletter is circulated among members and other like-minded organizations.
We are always seeking to improve the quality of this publication.

We welcome contributions of interesting news that cover loss prevention in the oil, chemical and process industries.

Please send your contribution or any queries to:

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