



SLP SOCIETY of LOSS PREVENTION news

In the Oil, Chemical & Process Industries (Singapore)

NOV 2004

MITA NO.: 132/06/2003

A Practical Approach to Safety Management

This was the subject of a technical talk on September 24 by Mr Teo Lek Hong, Country and Plant Manager of Infineum Singapore.

Infineum is a joint venture between Shell and ExxonMobil. It is a leading manufacturer and supplier of oil additives for the fuels and lubricating oil industries both locally and world wide. Its plant is on Ayer Chawan, Jurong Island.

The outstanding safety performance of the Infineum Plant on Ayer Chawan has been recognised by the Ministry of Manpower for a long time. It was therefore a privilege for SLP to hear from the man who has had a major role in this achievement.

Mr Teo spoke about the Safety Management System at his plant.

Safety Management System

- Safety Leadership, Policy & Rules
- Risk Analysis & Management
- Personnel & Training
- Facility Design & Implementation
- Maintenance & Inspection
- Work Permits
- Critical Equipment
- Operations & Maintenance Procedures
- Change Management
- Incident Investigation & Learning
- Verification & Effectiveness
- Emergency Response & Readiness

The components are not much different from other SMS's. How has Infineum translated the system into a way of life for their operations?

From the enthusiastic faces in the picture and the demonstrated performance, it is obvious that Infineum has a safety culture and this culture is thriving. While this is true, like a good safety practitioner, Mr Teo reminded the audience that it is hard work and attention to details that determine success or failure.

He chose to emphasise two aspects of his system -- Risk Analysis and Management, and Personnel. In Risk Analysis and Management, he spoke about knowing the hazards, assessing the risks, developing and implementing measures to manage the risk, developing, training on and using appropriate procedures. Lastly, he emphasised verification. In his words, "Verify, verify, verify".

On Personnel safety, he spoke about two aspects.

- Personnel are protected against personal injuries
- Personnel do not jeopardize major risk management systems



Safety is.....

... a culture..

... a journey ...

....is everybody's business

2004 has passed all too quickly. With the year-end rushing in on us, it is appropriate to look back and reflect on the year just gone by. For SLP itself, we went about our business as usual. The Executive Committee was returned for another two years, July, 2004 to June, 2006. While this gives stability to the society, it could be too much of a good thing. A little changing of the guard would do us some good. Members should think seriously about coming forward to serve in our committees. At the very least, members should let us know what sort of activities they want to see us do.

On Member governance, we introduced the Absent Member scheme to encourage members to retain their links with us even though they may be working overseas for extended periods of at least a year.

To recognise contributions by members to SLP, we initiated a Recognition Scheme for members who have made significant contributions to the success of SLP and the promotion of its objectives. This would be a way to recognise a member short of awarding him/her an Honorary Membership.

We are pleased to report that we have signed on more Corporate Members this year than in the recent past. This is important because Corporate Members are the employers of our members.

We tried a new format for technical meetings by introducing round table discussions. We successfully conducted two such events on security awareness/management in the current security and safety environment. Participants came from industry, regulatory authorities and the police.

Training of our members provided a disappointment. We did not make as much progress as we hoped. Members would remember that we conducted a survey on this subject. Unfortunately, our hoped for collaboration with another party did not come about. Currently, we are working with the Singapore Chapter of the Institution of Chemical Engineers to conduct joint training courses on Safety, Health and Environment. Discussions are going very well and members can look forward to see announcements on this subject in early 2005.

In this issue, we report on a technical talk by Mr. Teo Lek Hong, Country and Plant Manager of Infineum Singapore. Lek Hong's team has been recognised by the Ministry of Manpower for its safety excellence for several years. The insights from him are very valuable indeed. Thank you Mr. Teo.

Mr. Gregory Poi from Singapore Polytechnic has contributed an interesting article on a successful bioremediation project that he had worked on. The result of this work is important for the oil and ship-repair industries in Singapore.

Our President has written about the developments in loss prevention since Bhopal – 20 years ago. For the Singapore community, 2004 cannot be classed as a good year for industrial safety. While there has been much legislation on this subject, it is worthwhile noting that the cause of accidents is usually not due to the lack of knowledge. Rather, it is traceable to the failure to effectively use the knowledge that is already available.

For our Hindu friends, we hope you have had a **Happy and Safe Deepavali.**

For our Muslim friends, **Selamat Hari Raya Aidilfitri.**

We are in time to wish our Christian friends a **Merry Christmas.**

And to everyone a **Safe, Happy and Prosperous New Year 2005.**

PRESIDENT'S MESSAGE

Reflections on Bhopal

20 years ago, in December 1984, the chemical processing industry had its worst ever incident. The Union Carbide plant in Bhopal released over 20 tonnes of methyl isocyanate. The resulting death toll is estimated to be over 3000 people. Over 100,000 people are estimated to have suffered respiratory illnesses, many permanently.

Unfortunately, Bhopal was not an isolated incident. Other plants had incidents before and after Bhopal.

The loss prevention industry responded to this and similar incidents in several ways from inherent safety to green chemistry. The public did not hold the chemical process industry in high esteem and still does not. The governments of the world have responded by legislating the industry. In Europe there have been over 500 pieces of safety, health and environment legislation written in the last 10 years. One of the most significant is the safety case legislation.

The industry has also responded with its own programs. The profession of loss prevention has developed significantly over the last 20 years. Our knowledge of how we can run our plants more

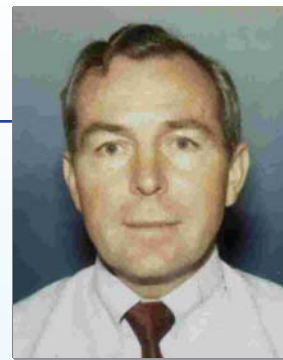
safely has increased significantly. Our tools for managing safety in our plants from risk assessment to standards have developed.

More importantly the development of the Internet has enabled the knowledge we have to be widely shared. It is imperative we take and use this knowledge. Trevor Kletz (an honorary member of the SLP) has stated "Accidents are not due to lack of knowledge, but failure to use the knowledge we have."

When the Bhopal plant works manager was informed of the accident, he actually said in disbelief, "The gas leak just can't be from my plant. The plant is shut down. Our technology just can't go wrong. We just can't have leaks."

We need to avoid the danger of overconfidence and complacency. Hazards do not take holidays. We have the capability to prevent another Bhopal. It is our responsibility to do so.

Best wishes to all readers for the festive season.



For Safety Performance Excellence, Infineum paid attention to the Human Machine Interface (HMI), Behavior Based Safety Observation (BBSO), Last Minute Risk Assessment (LMRA) and Hazard Identification (HI).

HMI was integrated with the quality concept of Continuous Improvement. Operators and other plant personnel were trained and encouraged to make observations and to initiate continuous improvement steps to reduce human and machine interface hazards eg. installing sensors to ensure that a feed hopper cover is closed before starting a reactor.

In BBSO, Infineum has implemented an observation program. As practitioners know, this is the defining test of good behavioral safety implementation. The picture shows the three steps in this process – Observe, Intervene and Comments/Praise.



In LMRA, operators and other plant personnel are taught to ask 4 questions before starting a job.

- Do I know what to do for the job?
- Could I hurt myself or somebody else or could they hurt me?
- Do I know the potential hazard?
- Am I taking action to eliminate the hazard?

In HI, a Potential Hazard Report Program has been put in place. Employees are trained to identify hazards, to report hazards, to remove or rectify the hazard, and if this is not feasible, to report to others who can rectify the hazard.

Mr Teo took questions after his talk. Among other things, he was asked to expand on his experience on BBSO. He emphasised the importance of training every employee in the process -- the theoretical psychological aspects as well as the day to day actions that must be rigorously taken eg. observations and follow up. Employees must understand and believe that observations are not meant as criticisms. The climate (or culture) must be right. An organization did not arrive at this point over night. A long term sustained effort was required. Managers had to “walk the talk”. To ensure that managers paid sufficient attention, safety performance was a significant factor in determining their annual compensation.

The lesson to be learnt is that good safety performance is like any other business process. It needs sustained attention from management to ensure follow through at every level of the company. The knowledge exists. The challenge is the determined application of this knowledge.

By Ngiam Tong Yuen

Book Review

Tolley's Handbook of Disaster and Emergency Management: Principles and Practice
 Edited by Raj Lakha, Safety Solutions UK Ltd and Tony Moore, Cranfield University
 ISBN 0-4069-5709-6

This handbook is a compilation of 18 related chapters written by 14 UK practitioners in their specialist fields of disaster and emergency management. It is a reference book for professionals with responsibility for Business Continuity Management, Crisis Management, Fire Safety Management, Emergency Planning and Loss Prevention in both the private and public sectors.



The book is based on UK experience and practice. Nevertheless, practitioners in Singapore, which has a similar approach to that of the UK, will find the book relevant and useful for the information and case studies provided by the authors.

The book begins by addressing Business Continuity Management and six case studies on International Disasters.

The next 16 chapters provide in-depth information about:

- Construction Related Disasters
- Crisis Management
- Disaster and Emergency Management System
- Emergency Planning for COMAH and Non-COMAH Sites
- Historical Context of Environmental Health and Communicable Disease Control within the UK
- Environmental Management
- Fire Safety Management for Public Buildings
- Forensic Fire and Explosion Investigation
- Human Error and Human Factors
- International Aspects of Disasters –ILO Code of Practice
- Insurance, Losses and Risk Management
- The Law Relating to Emergencies and Disasters
- The Medical Response to Disaster
- Rescue Equipment and Response
- Terrorism
- Training and Exercising for Effective Preparedness and Response

The book is a valuable quick reference source that will provide a comprehensive coverage of Disaster and Emergency Management. The book is certainly in line with current thinking. For example, Chapter 11 – Human Error and Human Factors - addresses management's responsibility for creating a safety culture within an organisation and Chapter 17-Terrorism - addresses anti-terrorism methodology.

After reading it, I felt as though I had gone through a rigorous course on Disaster and Emergency Management. This is a book worth reading and studying.

By Fong Mun Seong



Medics at work

Bioremediation in Singapore: A cost-effective and environmentally friendly technology to treat oil/ sludge/ cyclic-hydrocarbon contaminated soil.

"97% reduction in just 9 weeks to less than 1000ppm"

The disposal of oil and sludge waste has long been a problem in the oil and shipping industry. While dumping and land-filling without any treatment have been common practices in the past, the increase in environmental awareness has led to such practices being abandoned. Other methods such as thermal desorption and incineration have been adopted. However, these do not provide a cost-effective nor environmentally sound solution when compared to that offered by bioremediation.

With the price of oil exceeding the US\$50 mark, even 2-stage thermal desorption systems are no longer attractive, not to mention the fact that the residual materials have an even higher heavy metal concentration that needs to be dealt with. Although incineration appears to be an effective solution, it actually creates a problem of incineration ash with extremely high concentrations of heavy metals, and the release of undesirable fumes to the environment. At more than S\$200 a metric tonne to incinerate in Pulau Sebarok in Singapore and more than RM400 a metric tonne at Pasir Gudang in Malaysia, it is not a cheap solution either.

Bioremediation offers a much cheaper and more environmentally friendly technology than either of the above. It has been practiced in the United States for some years since the Superfund project was initiated by President Jimmy Carter after the Love Canal fiasco, and gained widespread acceptance ever since the Exxon Valdez incident, where it was used to great effect.

Bioremediation is different from other conventional technologies in that it relies on microorganisms to biodegrade the contaminants. These are typically specially screened, selected and enhanced to allow them to tolerate extremely high contaminant loads and target specific types of compounds. A good application would even thrive in situations where the normally occurring microbial population would not only be useless, but be effectively destroyed. Examples of these compounds include dioxin, phenolic compounds, PCPs, PCBs and BTEX.

The advantages are primarily in that bioremediation is very cost effective and that it typically renders the toxic target compounds harmless through microbial metabolism. There is no need for costly transportation charges and future liabilities; it can even be done on site. The disadvantage is that it often takes a long time unless the system is set up with the use of specially enhanced starter cultures with performance boosters. The treatment time has been successfully reduced to 9 weeks in a Singapore case study that is discussed below.

A quick literature survey of internet articles on bioremediation will put the cost of oil/sludge/soil bioremediation at about US\$50 per metric tonne at the lower end of the scale, to over US\$100 per metric tonne depending on the site, extent, and complexity of the contamination, and importantly the time duration allowed. In the typical case, the minimum period is 120 days, with some published data going as high as several years, for an effective reduction of about 75-95%. However, most of these would caution that the original concentrations should not exceed 50,000 ppm of petrol hydrocarbon content.

Singapore is a key petrochemical and shipping hub that generates significant quantities of oil/ sludge and other petrochemical wastes that make for very undesirable consequences if not dealt with effectively. Bioremediation offers a cost effective and environmentally friendly solution but is very much an unknown in Singapore.

In 2003, a pilot project was conducted with an MNC in Singapore that dealt with tanker sludge from bunker fuel that had been in open storage for a considerable period of time. This project has since matured into a bioremediation pit of the following dimensions: 20m by 11m by 1m, with more than 97% reduction in just 9 weeks. Samples were taken from 5 equidistant sites, and included samples that had initial concentrations in excess of 50,000 ppm of petrol hydrocarbon. The final figure was below 1000 ppm, taken from an average of 5 sample sites at 1 foot below the surface. This was achieved at just a small fraction of the cost of incineration or thermal desorption.

As noted above, bioremediation is currently not widely used in Singapore. The main reason could be that the solutions being offered in the market are mostly from the US and these are based on US developed technology. To overcome this obstacle, the technology used in the Singapore project was developed and proven here. Unlike many overseas examples, expensive tractor ploughs or excavators were not used to mix the soil. The project was done on a small island without the use of heavy equipment for tilling.

The Singapore developed technology is cost-effective and environmentally friendly. Technical and scientific support for industrial users of this technology are readily available. With this infra-structure in place, bioremediation should now be more widely used.

Note:

While the field sampling and actual biotreatment work was done by the staff of the MNC, all the testing was done and certified by Dr Puah Chum Mok, at the Technology Centre for Life Sciences at Singapore Polytechnic. The bioremediation technology and consultancy was provided by Gregory Poi, School of Chemical and Life Sciences, Singapore Polytechnic.

Telephone Contacts:

Gregory Poi 6879-0609
Dr Puah Chum Mok 6772-1896

Welcome

We extend a warm welcome to:
Ordinary Members

Mr Ang Boon Tian, Shell Eastern Petroleum (Pte) Ltd.

Boon Tian is an Industrial Hygienist. He provides industrial hygiene support for Shell Oil Products for Asia Pacific. This includes programs, consultation, training and audits.

Prior to his present appointment, he was Senior Environmental, Health and Safety Advisor for a multinational pharmaceutical company.

He holds a bachelor's degree in Chemical Engineering and a master's in Environmental Engineering, both from the National University of Singapore. He is a Certified Industrial Hygienist (CIH) of the American Industrial Hygiene Association.

Mr Vijay Prasad, Foster Wheeler Eastern Pte Ltd.

Vijay has a degree in Chemical Engineering and a Diploma in Computer Applications. In addition to this, he has had training in HAZOP, PHR and PSSR Leadership from companies such as Eutech and ABB.

He has over 20 years experience in Refineries and Petrochemical plants in various capacities in Commissioning, Operations, Safety and Quality. He is experienced and knowledgeable of quality management and systems eg. ISO 9002.

Ms Poon Yoke Yin, National University of Singapore

Yoke Yin is a Laboratory Officer with NUS. Prior to this, she was a Laboratory Technologist at the Institute of Mental Health.

She has a Diploma in Biotechnology from Temasek Polytechnic and a BSc from Melbourne University.

As always, we hope to see you all at our activities and look forward to your contributions.

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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