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Newly purchased Ground Floor Flat for SEA (India) office at Virugambakkam, Chennai.

NEBOSH Course Update

Enquiries are received for conducting the next Batch of Nebosh IGC course. As SEA (India) office bearers and the Tutors were busy with purchase & registration of new office premises for SEA, dates for the next batch could not be finalized , immediately. Now, it has been decided to occupy the new office premise in May 2015, and hence the next batch of NEBOSH, IGC course can be conducted by July 2015. Interested members can register their willingness by sending their Name, Qualification, Contact number and their Mail ID to paramesh48@msn.com or seaindiachennai@rediffmail.com .

Other details like the course fees and dates may also be obtained from them.

Inside....

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FROM THE DESK OF PRESIDENT

Dear Members,

Greetings to all of you!!

Happy to share the latest development that our long felt desire to shift our SEA office to a more convenient and spacious premises is now getting fulfilled. A ground floor office premises very near to Chandra Metro Mall (INOX Theatre), Virugambakkam, Chennai has been purchased and the existing office premises at Porur has also been sold. We plan to shift our office to the new premises shortly. Communication on the new address and contact details will be sent to you soon.

SEA has conducted a one day Safety Workshop at Anna University, Chennai on 04-03-2015 in commemoration of National Safety Day and as part of their CHEMFLUENCE 2015. Senior officials of SEA participated in National Safety Day celebrations held in different industries including "Technip".

Executive Committee meetings of SEA were held every month during Jan 2015 to March 2015 to discuss and decide decisive steps during the purchase of the new office premises and sale of the existing office premises. Professional Development Programme on "Safe Handling of Hazardous Waste Materials and their Management" by Mr. S. Mani, President, SHE & CSR, Orchid Pharma Chennai who is also the Chairman of IWMS is scheduled on 05-04-2015. Our quarterly journal "Indian Safety Engineer" and the monthly 'Safety Alerts' are brought out and distributed to Members periodically. Organsing a Factory visit programme is kept on hold as SEA office bearers were busy engaged in registration of new office and sale of existing premises.

Mumbai Chapter of SEA and Students Chapter at Anna University, Chennai are active.

Discussions were held with Director, Industrial Safety & Health (DISH) regarding organizing a Safety Professionals Meet during May 2015. The programme is being designed to give opportunity for the safety professionals and industry Reps. to have a face to face interaction with the regulators of Factories Act and BOCW Act. Members are advised to make use of this opportunity by attending the programme in large numbers.

Next Nebosh IGC course is being planned during July 2015 and aspiring safety engineers may enroll their names with SEA office, as seats will be limited to 20 on first come first served basis.

Our website www.seaindia.org is being redesigned to include more additional features including advertisements from safety service providers. The site is expected to be launched shortly.

Members are advised to take active part in different programmes of the association and contribute their mite.

Best Wishes and Seasons Greetings!

S. Ulaganathan
President, SEA (India)

Kind Attention of Members....

Of late, Safety Alert by e-mail and Journal through post return to the sender. Hence, SEA (India) members are requested to send their current postal address and active email ID (personal) to us at the earliest to:

seaindiachennai@rediffmail.com / safetyengineersindia@gmail.com

FIVE WAYS TO IMPROVE YOUR SAFETY BEHAVIOUR

It is now common for safety professionals to look to improve safety culture at their organization, as it is a critical factor in ensuring continuous improvement in safety management programs. This paper will argue that one of the most effective ways of developing a positive safety culture in a workshop is by looking at safety behaviour, and will identify five ways to ensure that safety behaviour will improve over time.

What is Safety Behaviour & Why is it important?

Safety culture can be thought of as the attitudes, beliefs and values held by employees about safety. Unfortunately, attitudes, beliefs and values are very difficult to measure, but employees's day-to-day behaviour can be monitored and measured, and is a reliable indicator of their attitude to safety in the workplace. If an employee behaves in a way that values safety, then their attitude and beliefs towards safety can be said to be positive. Therefore, it can be said that the more positive the safety behaviour, the stronger the safety culture. In effect, you need to have an understanding of what employees do from a safety point of view, why they do it, and then take action to improve the behaviour to meet the company's safety goals and objectives.

Ofcourse, the knowledge that safety behaviour is important is only useful if you have some idea how to improve it. Of the many different ways that you can look to influence employee behaviour, five in particular are critical to the success of any safety behaviour improvement initiative.

1. Increase visiblity of Standards and Impacts

Visibility is critical for improvement to be made. First, the organization's expectations regarding safety behaviour need to be communicated as early and as regularly as possible. This communication needs to be reinforced repeatedly from all levels of the organization. Employees need to be aware exactly what safety behaviours are expected, how their behaviour is being monitored, and how they can improve. Without this knowledge, it is impossible for employees to have an idea of how acceptable their current safety behaviour is.

Secondly, the impact of positive safety behaviour needs to be shown. If employees are not aware of the positive outcome of safety behaviour, it can be very difficult to motivate behavioural change. The greater the level of transparency and visibility, the more successful your safety programs will be.

2. Be Consistent and have Company Commitment

Organizations also need to show conistency - both in communication and application of safety standards. Too often you will see a supervisor run over to talk to an employee about not wearing the correct personal protective equipment, while the supervisor is also not wearing any PPE. This creates a toxic double standard. Commitment must be shown through action and behaviour - every time a blind eye is turned to poor safety behaviour, it is effectively condoning it as acceptable.

Upper levels of management must lead from the front and be consistent about making a positive safety behaviours a priority, both through their own actions and those of the staff working below them. It is all too easy to delegate enforcement of safety standards, but if upper levels of management take the opportunity to discuss safety issues directly with frontline staff, it sends a powerful message regarding the priorities within the organization.

3. Increase Engagement and Empowerment

Employees must be encouraged to commit a great level of involvement in safety activities - and more than simply being part of a safety committee. For example, employees should (of course), be encouraged to report safety hazards without fear of discipline, but they should be encouraged to provide innovatives ideas of how to fix safety issues. Rather than relying on the safety team and the supervisor team to fix everything, the employees should be involved in generating solutions to safety problems. In many cases they are closest to where the incident happened (or they are the injured party), so they have their own intrinsic motivation to not get injured again. Frontline employees often come up with ideas that the safety team would have never thought of.

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Five ways....

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Engagement and Empowerment promotes proactive behaviour instead of reactive behaviour. Rather than waiting for employees to report hazards of recording injuries, once employees have the power to identify and fix the problems, they will begin seeing how to fix something before anyone is hurt.

Care must be taken, however, to provide training and boundaries to ensure that suggested fixes are appropriate and within scope. Without this training, employees can sometimes suggest prohibitively expensive solutions, or be upset if their suggested fix is not carried out. The key is to empower employees, but within range, and raise awareness of what other resources are available if the counter-measures that are suggested are costly, or would result in a project that exceeds the capabilities of the safety team to implement.

When promoting proactive behaviour rather than reactive behaviour, you must avoid overly-aggressive discipline policies. This does not mean do not have any discpline policies, but you have to be aware of the behaviours you are trying to encourage, and what types of discipline best supports them. An aggressive discipline policy will foster a culture of fear, and will motive employees only because they want to avoid trouble. A better way is for the motivation to come from a desire to keep themselves safe, and to improve the safety of their co-workers. If you find your employees are too scared to generate innovative ideas to speak up to other collegues about safety, it may be because they are motivated by fear, rather than wanting to improve safety.

4. Provide appropriate Recognition for Positive Behaviour

Incentive programs should reward innovation and continuous improvement, but focus should not be placed on the reduction of injuries and accidents, as that will ultimately discourage reporting.

Also care must be taking when defining the value of the rewards for positive behaviour. Too small, and it will have no impact, but large rewards increase the risk of the system being gamed.

An incentive as simple as providing on-the-spot gift card to employees who demonstrate positive safety behaviour can provide reinforcement that the behaviour is noticed by management and appreciated.

5. Measure and Monitor appropriately

For safety behaviour to improve, you must promote open and honest reporting. It can be all too easy to focus on accident rates, but you should instead look to track proactive indicators such as the number of spot checks completed (including how many resulted in identifying good behaviour vs those that identified need for improvement), the number of innovative safety ideas submitted or number of incidents caused by employee behaviour.

Also, whenever possible, you should look to categorise root causes to identify if they are behavioural issuses, or can be attributed to a non-behavioural category, such as equipment malfunction or ineffective procedures. The more data you can collect and analyse around your organization's safety behaviour, the more effective your safety decisions can be around improving your safety system.

Conclusion

When your safety management system is transparent and visible, engages and empowers your employees and is shown to have the backing and support of all levels of management, employees will embrace safety practices over time. By measuring, reporting and rewarding, based upon appropriate metrics and incentives, positive safety behaviour will become the norm in your organisation.

This safety culture, crucially, will be based upon a desire to keep coworkers safe, rather than through fear of punishment. It will be safety culture that grows stronger over time and ensures that employee safety is a priority for everyone in your organization, not just those within the safety department.

DISCLAIMER: All information contained in this Journal, were obtained from sources, believed to be reliable and are collated, based on technical knowledge and experience, currently available with the Editorial Board of SEA (India). While SEA (India) recommends reference to or use of the contents by its members and subscribers, such reference to or use of contents by its members or subscribers or third parties, are purely voluntary and not binding. Therefore the Editorial Board of this Journal or SEA (India) assumes no liability or responsibility whatsoever towards any bad or undesired consequences.

LIGHTNING INJURY & MANAGEMENT

Background

Lightning occurs when particles moving in a thunderstorm create static electricity and negative charge builds up at the bottom of the cloud. When the difference between this and the positively charged ground is great enough, an electrical discharge occurs. Lightning strikes the earth more than 100 times each second and 8 million times per day. There is a 1 in 2,000,000 chance of being killed by lightning in the UK. The chance of being struck increases if the person is wet or carrying a metal object. Thus, hikers, campers, golfers and other outdoor sports enthusiasts most often sustain lightning injuries

Types of lightning strike

- Direct hits: occur outside, often when the person is carrying a metal object (umbrella or even a hair clip).
- Contact injuries: these can occur when a person is touching an object that is struck.
- Flash discharge: when a high resistance object close to the victim (eg a tree) is hit, the resistance to direct current flow in the air between the tree and victim is less than that to direct current flow in the tree and, as lightning seeks the path of least resistance, it will jump from the tree to the victim. This can also happen between people.
- Ground current phenomenon: if a person is standing with their feet spread and is struck, they may create a potential difference large enough to create a circuit between the legs and ground. This method of injury may account for the high mortality (30%) of lightning victims with leg burns and for the fact that burns to the arms and trunk are not important predictors of mortality in lightning strikes.
- Blunt trauma: can occur if the person is thrown by massive skeletal muscle contraction.
- Flashover effect: this is where the current passes over and around the casualty's body but not through it. Clothes and shoes are torn apart but there are only superficial skin wounds (unless the clothes catch fire and burn the skin before being blasted off).

Clinical effects

The clinical effects are very different from a high-voltage shock on account of the brief and instantaneous time of exposure and the fact that it is a direct current. The flashover effect diverts the current around the body and so internal injury is spared. The popular belief that lightning is invariably fatal is wrong (the mortality rate is in fact about 30%).

- Immediate effects - cardiac arrest (asystole) which may revert but which may be followed by a secondary hypoxic arrest. There may be chest pains, muscle aches and neurological deficits (ranging from unconsciousness to transient muteness which tends to resolve within 24 hours). Contusions and tympanic rupture have also been reported.
- Delayed effects - limb paralysis is common with flaccidity also being observed. The peripheral pulses may not be palpable and the skin takes on a mottled blue appearance. 'Feathery' cutaneous burns (Lichtenberg flowers) may occur immediately or over several hours but tend to heal well. Cataract formation, retinal detachment, optic nerve dysfunction, myoglobinuria, sensorineural deafness and vestibular dysfunction have all been reported.
- Pregnancy - there is a high rate of fetal or neonatal death (about 50%), even where maternal survival occurs.

Most lightning strikes are unwitnessed and the patient may simply present as unconscious or confused - send to emergency department for assessment.

Immediate management

- After the lightning has struck, the victim is safe to touch - check for responsiveness.
- Commence immediate cardiopulmonary resuscitation (CPR) - this may prevent the secondary hypoxic cardiac arrest.
- Carry out CPR even if the casualty appears dead (pupils may be fixed and dilated as a result of muscular paresis - they do not necessarily represent brain death).
- Be aware of the possibility of a spinal cord injury (evidence of head injury or tenderness or haematomas of the neck or back noted if the patient is conscious).
- If a group of persons is struck by lightning, direct attention to those with no signs of life, because the others will probably recover, although burns or injuries may need treatment.

It is worth remembering that 77% of patients with cardiopulmonary sequelae die despite best resuscitative efforts but, if they are to survive, it will be due to this first and immediate response. **(Contd. on next page)**

FACTBOX – INDUSTRIAL ACCIDENTS IN THE LAST TWO DECADES

Here is a look at some of the world's worst industrial accidents in the last 20 years after a deadly explosion and fire at a fertilizer plant in the small Texas town of West .

May 1993 - Over 200 workers are killed by a fire at a toy factory near Bangkok, Thailand.

November 1993 - Fire in a Sino-Hong Kong joint venture toy factory in southern Shenzhen province, China, kills 84 workers.

November 1993 - Explosions and fire in the explosives workshop of a chemical plant kill 61 workers in central Hunan province, China.

December 1993 - Fire sweeps through the dormitory of a textile factory in Fuzhou, China, killing 61 sleeping women workers.

June 1994 - A textile plant at Zhuhai, China, burns down and then collapses. The official death toll was 76, but unofficial reports say at least 200 died.

May 2000 - An explosion at S.E. Fireworks in Enschede in the Netherlands kills 20 people and injures about 1,000 as a fireball rips through the town, leveling more than 400 homes.

August 2001 - Three people are killed after an explosion at one of Europe's largest gas-fired power stations at Teesside, northern England. The 1,875-megawatt plant was operated by U.S. energy group Enron.

September 2001 - An explosion at a fertilizer factory in the French town of Toulouse run by AZF, a division of TotalFinaElf, kills 30 and injures 2,000 in surrounding areas.

October 2002 - At least two people are killed and 26 are injured when an explosion rocks a coke plant run by steelmaker Arcelor near the eastern town of Liege in Belgium.

May 2004 - Nine people are killed in an explosion which flattens a plastics factory in the Scottish city of Glasgow. More than 40 are injured. ICL Plastics and Stockline Plastics were in charge of the factory.

July 2004 - At least 15 people are killed and more than 100 injured when an explosion rips through the underground pipeline in the industrial zone of Ghislenghien, 25 miles (40 km) southwest of Brussels.

March 2005 - An explosion at BP's Texas City, Texas, refinery kills 15 workers and injures 180 in one of the worst industrial accidents in U.S. history. The explosion occurred when hydrocarbon liquid and vapor was released from a "blowdown stack" and ignited.

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Lightning....

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Further management

- As described above, most strikes are unwitnessed. Tell-tale clues include a casualty (or multiple casualties) found outdoors on a stormy day, exploded clothing, cutaneous burns (linear, punctate or feathery) and tympanic membrane rupture.
- Carry out full trauma assessment to look for immediate effects and initiate resuscitation as appropriate. ECG is mandatory and CT scan of the head may be indicated where consciousness deteriorates. If the patient is conscious, don't forget to document the visual acuities.
- Check tetanus prophylaxis status.
- Liaise with relevant departments (medical, renal, audiological medicine and ophthalmology) for monitoring of delayed effects.
- Consider differential diagnoses, including cerebrovascular event, spinal cord injury, seizure, closed head injury, Stokes-Adams attack, myocardial infarction, overdose.

Outcome

This is generally excellent for those who survive the initial strike. The outcome is coloured by the quantity and severity of secondary trauma. Permanent sequelae are found in 70% of cases

Prevention

The best treatment for lightning strike injuries is prevention:

- Remain indoors (or inside a closed car), away from doors and windows, fireplaces and metal objects, to avoid side flashes.
- When outside and unable to find shelter, maintain distance from tall trees, hilltops, or other exposed areas. A person caught outside in the open without cover should crouch on the ground with his or her limbs close together.
- Do not swim in a lightning storm.
- Lightning strikes through an airplane are not unusual and generally cause little or no damage.

FIVE SIMPLE STEPS TO REDUCE CARBON FOOTPRINT

There are simple steps any organization can take to reduce its carbon footprint. Some strategies involve an overall organizational effort, while others can be used to encourage employees to reduce their individual footprints. There are 5 simple steps that can have an impact on a company's carbon footprint.

Carbon footprint has three components:

1. Direct emissions: From on-site combustion and mobile sources.

2. Indirect emissions: From purchased electricity and steam.

3. Optional emissions: Examples include product transport, employee business travel, and employee commuting.

5 Simple Steps to Reduce the Carbon Footprint at Work

1. Encourage employees to cut paper use. Promote a "think before you print" mentality. Not every document needs to be printed. If something must be printed, train your staff to use "duplex printing," i.e., printing on both sides of the page. Documents that are for in-house use only can also be printed using multiple pages per sheet. Train your employees on how to select these options on their computers.
2. Make sure only the "right" paper is available. Purchase only environmentally preferable paper, which requires only half the number of trees as conventional paper. Encourage recycling by installing bins at several facility locations to make it easier to collect paper for recycling or reuse as notepaper.
3. Encourage less energy-consuming commutes. Switching to public transportation, car-pooling, biking, or telecommuting, can save energy and reduce Green House Gases (GHG) emissions on the way to and from work. You can offer your employees commuter benefits that can:
   a. Address limited or expensive parking,
   b. Reduce traffic congestion,
   c. Improve employee recruiting and retention, and
   d. Minimize the environmental impacts associated with drive-alone commuting.
4. Think about purchasing ENERGY STAR® products. Products bearing the ENERGY STAR labels are more energy efficient than standard products. In general, ENERGY STAR qualified products reduce energy costs by at least 30 percent. In addition, there have been significant reductions in GHG emissions because of the use of ENERGY STAR products in homes, businesses, and industrial operations.

Note: What is CO2E? Each GHG differs in its ability to absorb heat in the atmosphere. For example, methane traps 25 times more heat per molecule than carbon dioxide,

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Factbox....

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December 2005 - Fire breaks out after a wave of explosions rips through a fuel depot at Hemel Hempstead north of London. Police said the explosions, which injured 43 people, one seriously, appeared to be an accident. The depot, the fifth largest in Britain, is jointly run by oil companies Total and Texaco.

January 2006 - Explosion and collapse of a coal mine in Sago, West Virginia, kills 12 of 13 miners trapped for two days.

August 2007 - Six miners die when the Crandall Canyon coal mine in Utah collapses. Three members of a rescue crew die in a cave-in ten days later.

April 2010 - Explosion aboard the Deepwater Horizon drilling rig kills 11 rig workers and unleashes the worst offshore oil spill in U.S. history that spills 4.9 million barrels of oil into the Gulf of Mexico.

June 2010 - At least 116 people are killed in a fire which destroys shops and housing in the Bangladeshi capital, Dhaka.

August 2012 - An explosion tears through Venezuela's biggest refinery, killing 39 people, wounding dozens more and halting operations at the Amuay refinery in Venezuela in the worst accident to hit the OPEC nation's oil industry.

September 2012 - A fire races through the Ali Enterprises garment factory in the Pakistani city of Karachi, which made ready-to-wear garments for Western stores, killing 289 workers and injuring 110 more.

November 2012 - A fire at the Tazreen Fashions factory in Dhaka, kills 112 workers and injures more than 150.

April 2013 - A deadly explosion rips through a fertilizer plant in West, Texas, leveling dozens of homes and buildings. The death toll is unknown. More than 160 people were injured. ■

Five Simple....

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and nitrous oxide absorbs almost 300 times more heat per molecule than carbon dioxide. The ability of a GHG to absorb heat in the atmosphere is referred to as its global-warming potential (GWP). Often, estimates of GHG emissions are converted to units of MMTCO2E, which account for each GHG's GWP and allow for the direct comparison of the impacts of emissions and reductions of different GHGs.

5. Track your GHG emissions. Develop and document a GHG inventory to ensure consistency as your organization collects data each year to track progress toward reaching an emissions reduction goal.

Green strategies at work are not just operational; they involve educating employees and engaging them in ideas and innovation. Many companies, both large and small, have taken up the charge to be environmentally friendly and have reported benefits that include a boost in employee morale, customer appreciation, and reductions in operation costs. ■

CASE STUDY

CASE STUDY 1:

A FATAL ACCIDENT DUE TO FALLING IN A QUENCHING TANK CONTAINING HOT WATER

A fatal accident occurred while working at the quenching tank of the heat treatment furnace in the factory premises.

HISTORY:

The factory is involved in the manufacturing of the Aluminium castings components. The process was as follows. The raw material in the form of Aluminium ingots are melted in furnace oil fired furnaces. The molten metal was transferred to the LPDC machines (Low Pressure Die Casting Machines), where Aluminium castings were formed. These castings were subjected to fettling operation for removal of burrs, risers. Then these jobs were sent to heat treatment section. The heat treatment operation involved two processes- Heat Treatment-Solution and Heat Treatment-Aging. After heat treatment, the jobs are checked and dispatched.

The Heat Treatment-Solution plant was having a platform at a height about 3.0 metre with three openings in it. Electrical resistive furnaces were installed in each opening. Each furnace was provided with a separate underground quenching tank with its top open, which was right below the furnace. The quenching tank contained full of water in it. A gate was provided to the furnace at its bottom. Two manually operated loading trolleys were provided beneath the platform. Rails were provided along the tanks, on which trolleys moved. Two cylindrical baskets mounted one above the other were provided to each furnace in which jobs were charged, which was further loaded to the furnace. A hydraulic mechanism was provided for the movement of the gate and basket. The Heat Treatment-Solution process was as follows.

The baskets containing the jobs i.e. Aluminium castings were kept on the loading trolley. The gate of the furnace was opened and the baskets were loaded into furnace from its bottom. After closing the gate operator started the heating cycle. The temperature of the Aluminium castings reaches to 480° C. The furnace was kept on hold at this temperature for another 2 hours & the heating cycle was stopped. The workers pushed the loading trolley forward and the quenching tank became open. Then operator opened the gate of the furnace and lowered the baskets to dip it into the quenching tank containing water, with the help of hydraulic mechanism. After holding the baskets into the quenching water for 5 minutes, the baskets were again lifted up. The loading trolley was now again moved on the quenching tank and the baskets were kept on it. The trolley along with the baskets was then moved forward and another loading trolley along with baskets containing next batch of jobs was taken below the furnace. When the hot jobs were quenched into water, its temperature rises. Part of the water got evaporated. The water was added into the tank to make up the water lost. The temperature of the water in the quenching tank remained about 75° C. The process was repeatedfor next batch.

ABOUT THE ACCIDENT:

The injured worker was through the contractor and was working as helper in the factory. On the day of incidence, the injured worker along with the other worker was entrusted with the work at the quenching tanks of the Heat Treatment-Solution section. The work involved was as under. When the jobs were ready for quenching, they were pushing the trolley forward by legs. After quenching the trolley was brought back on the tank by them and the basket containing jobs was kept on trolley.

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Case Study....

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Then they were moving trolley out and sending it for next process. Then again, they were keeping next batch, on another trolley for the heat treatment process. The heating cycle of the furnaces of the Heat Treatment-Solution was started and continued. At the time of accident, the jobs in furnace were ready for quenching, so the operator asked the injured and other worker to move the trolley forward, so as to quench the jobs in the tank. So, the other worker from left side and the injured

worker from right side of the trolley, started pushing the trolley forward by legs. While pushing the trolley, the injured worker lost balance and fell into the quenching tank through its top, which became open as the trolley moved forward. As the tank contained the hot water having temperature about 75° C, he received 84-85 % burn injuries. He succumbed to burn injuries, while under the treatment in the hospital.

OBSERVATIONS:

The plant was having a platform of size about 5200 mm L x 11500 mm B x 3000 mm H. supported by pillars formed by m.s. channels. There are 3 No. of circular openings in which cylindrical shaped electrical resistive furnaces No.1,2,3 were installed. The furnace was installed vertically in such a way that 2000 mm of its length above the platform and 600mm of length below the platform. A hydraulically operated gate was provided at the bottom portion of the furnace. A hydraulically operated mechanism is provided for the vertical movement of the baskets. Two baskets, one mounted above the other, were provided for charging the jobs and have total capacity of 500 Kg. Beneath the furnace, there was an underground quenching tank having its top open. The size of the tank was about 2400 mm length x 2400 mm breadth x 3000 mm depth, which contained water as a quenching medium. There was a pair of rails, which was laid along the tank. The front side of the compartment was open through which there was an access to the tank. The rear side was provided with a removable m.s.bar (pipe) at a height about 900 mm. The left and right sides of the compartment were provided with the m.s. bar at a height of about 1050 mm. There was access to the tank from lower portion of the bar provided at left, right and rear sides. A water feeding arrangement was provided to each tank. The temperature of the quenching water remained 75° C. The loading trolley is manually operated. It was formed by welding m.s. plate on the frame of m.s. channels and is provided with 4 no. of wheels. The size of the trolley is about 2450 mm L x 2450 mm B x 150 mm H.

WHAT WENT WRONG:

The injured and other worker was required to push the trolley forward & reverse over the quenching tank of the furnace. When the trolley was moved, the top of the quenching tank became open. The temperature of hot water in the quenching tank remains about 75°C during the operation. Thus the underground quenching tanks in the Heat Treatment-Solution Plant by reason of its depth, situation, and contents were a source of danger. The fatal accident to the worker occurred while pushing the trolley over the quenching tank of the furnace. The quenching tank ought to have been securely fenced by providing adequate guards for preventing access to the quenching tank. But there was an access to the quenching tank from all sides.

REMEDIAL MEASURES SUGGESTED:

i) The portion below the platform shall be provided with adequate fencing by using strong metallic guards from both sides and remaining portion of the front and rear portion shall be securely fenced. The height of guard rail shall not be less than 1 metre.

ii) The loading trolley shall be provided with railings guard from all sides.

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Case Study....

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iii) There shall not be any access to any person to the quenching tank, while in operations.

iv) Precautionary notices shall be displayed in the language understood by the workers.

v) The temperature of the quenching water shall be monitored by providing fixed temperature metre near the respective tanks.

CASE STUDY 2:

A FATAL ACCIDENT AT A PACKAGING COMPANY

Three workers were killed in an explosion at a fibre board manufacturing facility in USA while they were welding on a temporary metal clamp to stablise a damaged flange connection. The flange was located on top of an 80 foot tall storage tank that contained recycled water and fiber waste.

Facility personnel were unaware of the potential presence of flammable gas from the decomposition of the organic material in the tank, and combustile gas monitoring was not typically required or performed prior to starting work. At the time of the accident, three workers were on a catwalk above the tank; one begain welding the flange in to place when sparks from the welding ignited flammable vapours inside the tank. The resulting explosion ripped open the tank lid, knocking two of the workers to the ground 80 feet below. All three workers died of traumatic injuries. A fourth worker, who had been observing the work from a distance, survived with minor injuries.

The chemical analysis of the tank contents determined that anaerobic bacteria multiplied inside the and water recycle system over time, feeding on organic waste material. The bacteria likely produced hydrogen, a highly flammable gas, which ignited during the welding work. The chemical analysis found that at the time of the incident, supervisors and workers were unaware of the risks of flammable gas production from anaerobic bacteria growth. They did not perform a hazard analysis or recognise fiber waste tanks as potentially hazardous. Combustible gas monitoring was not required for the work.

SEVEN KEY LESSONS FROM RECENT HOT WORK ACCIDENTS:

1. **Use alternatives** – whenever possible, avoid hot work and consider alternative methods.
2. **Analyze the Hazards –** Prior to the initiation of hot work, perform a hazard assessment that identifies the scope of the work, potential hazards, and methods of hazard control.
3. **Monitor the Atmosphere –** Conduct effective gas monitoring in the work area

View of the storage tank involved in the explosion

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Case Study....

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using a properly calibrated combustible gas detector prior to and during hot work activities, even in areas where a flammable atmosphere is not anticipated.

4. **Test the area –** In work areaswhere flammable liquids and gases are stored and handled, drain and/or purge all equipment and piping before hot work is conducted. When welding on or in the vicinity of stroage tanks and other containers, properly test and if necessary continuosly monitor all surrounding tanks or adjacent spaces (not just the tank or container being worked on) for the presence of flammable and eliminate potential sources of flammables.
5. **Use Written permits –** Ensure that qualified personnel familiar with the specific site hazards review and authorise all hot work and issue permits specifically identifying the work to be conducted and the required precautions.
6. **Train thouroughly –** Train personnel on hot work policies/procedures, proper use and calibration and combustible gas detectors, safety equipment, and job specific hazards and controls in a language understood by the workforce.
7. **Supervise contractors –** Provide safety supervision for outside contractors conducting hot work. Inform contractors about site-specific hazards including the presence of flammable materials.

The importance of the lessons is evident upon review of the 11 accidents briefly described here. While each lesson will reduce the likelihood of a catatrosphic hot work accident, special attention should be paid to Key lessons #2 and # 3 – the importance of analyzing the hazards and utilizing a combustible gas detector to monitor for a potential flammable atmosphere.

While the OSHA standard prohibits hot work in an explosive atmosphere, it does not explicitly require the use of a combustible gas detector. However, other good practice guidance documents from the authorised sources stress the need for gas monitoring to prevent fires and explosions. For example, use of gas detectors when conducting cleaning, repairs, or hot work on or inside tanks and containers that hold or have held flammables. Gas testing must be conducted "before and during any hot work, cutting, welding, or heating operations".

Avoid hot work of any kind in areas handling, processing or storing flammable liquids or gases".

Use of portable combustible gas analyzer before and during the work. If any detectible readings are obtained, then work cannot begin or continue until the source is found and suitably mitigated such that the contentration is maintained below 10% of the Lower explosive limit (LEL).

If the Lower Explosive Limit (LEL) rises to 10%, all work should be stopped and source of the flammable atmosphere located and eliminated or controlled.

An appropriate safety management system including an analysis of the hazards and the proper use of combustible gas detector, would likely have alerted workers to the presence of a flammable atmosphere before disaster occurred. ■

WHAT ARE MSIs?

Musculoskeletal injuries or MSIs involve the muscles and bones in the body, as well as the nerves, ligaments, blood vessels, and tendons.

MSIs occur when the demands of work exceed the capacity of the body.

Types of MSIs

Ligament sprain

Ligaments attach from bone to bone.

Sprains often caused by rapid overstretching, abnormal twisting or bending.

Common injury: A carpenter climbing down a stepladder steps on piece of wood on the floor, turns an ankle and suffers an ankle sprain.

Tendon or muscle strain or tear

Tendons attach from bone to muscle.

Strains are often caused by rapid overstretching, overloading or abnormal twisting.

Common injury: Industrial painter using an extension pole for long periods strains the rotator cuff muscles of the shoulder.

Tendonitis

Tendons often rub against bony structures and become swollen due to repeating similar movements.

Common injury: Swinging a sledgehammer repeatedly can result in tendonitis of the elbow.

Bursitis

Bursae are sacs filled with fluid and located between a bone and a tendon or muscle in order to reduce friction.

Bursitis occurs when the bursa become swollen due to repeating similar movements.

Common injury: Bursitis in the knee is common among carpet layers who kneel for long periods and use their keen as a hammer.

Herniated intervertebral disc

Discs located between the bony vertebrae in the back consist of a

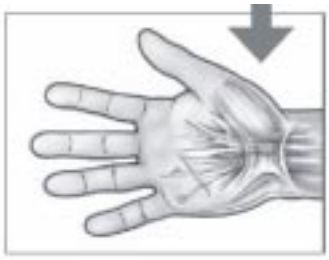
soft core surrounded by a tough outer shell.

Sudden twisting or bending movements or a slow deterioration can cause the disc to bulge and compress the nearby spinal nerves.

Common Injury: Labourers commonly hurt their backs by physically carrying heavy ackward loads.

Nerve entrapment

Nerve supply the muscle with signals of when to contact and when to relax.



Nerves become compressed by swelling of surrounding tissue.

Common injury: Road workers may suffer from Carpal Tunnel Syndrome in the wrist when they routinely tie rebar by hand. ■

IN THE NEWS

World Day for Safety and Health at Work: Message from ILO

The theme of the campaign for 2015 is: Join in building a culture of prevention on OSH.

A national occupational safety and health culture is one in which the right to a safe and healthy working environment is respected at all levels, where governments, employers and workers actively participate in securing a safe and healthy working environment through a system of defined rights, responsibilities and duties, and where the highest priority is accorded to the principle of prevention.

This year, we will improve the SafeDay web page with new and user-friendly information to design your own campaign. You will be able to download a number of other key documents including the trilingual poster. However there will not be a report as in previous years. We invite you to visit our interactive web page as from beginning of April 2015. Please keep us informed on the activities that you will develop in this context.

The ILO celebrates the World Day for Safety and Health at Work on the 28 April to promote the prevention of occupational accidents and diseases globally. It is an awareness-raising campaign intended to focus international attention on emerging trends in the field of occupational safety and health and on the magnitude of work-related injuries, diseases and fatalities worldwide.

Environment ministry plans to revise norms for polluting industries

The environment ministry is considering revisiting the system of categorising industries that seek permission to set up and operate units. It has suggested giving higher consideration to air pollutants, effluents and nature of waste - hazardous or otherwise - produced as part of an industrial unit's operations.

The proposed system, which will be discussed with the states, will be based on "scores" that industrial units will be given on the basis of these pollution-related parameters. The new classification is part of the ministry's effort to put in place a system that is responsive to environmental challenges while providing industries with a more conducive set up. The proposed classification will be on the basis of a composite score - comprising 40% weightage for air pollution, 40% for water quality and 20% for nature of waste.

The parameters will include toxic pollutants, besides the standard basket of particulate matter, sulphur dioxide, nitrous oxide, benzene, ammonia, the pH (to ascertain the level of acidity of water quality), total suspended solids and level of dissolved oxygen. Industries that score more than 60 will be classified as red, those from 30 to 59 as orange, from 15 to 29 as green while units with less than 15 will be considered as non-polluting.

Consent to operate will be specified for a time limit, after which there will be a review -red category industries will be given consent for five years and orange for eight. Green categories will require a one-time consent for the life cycle of the unit, while nonpolluting industries will not require any consent.

Industries are currently classified into three categories in decreasing order of severity of pollution - red, orange and green. Introduced in 1989, this system was geared to link the pollution potential of industries at a particular location to help people understand the severity of pollution from a specific industry. Given the location-specific component, it is not possible to have a uniform classification throughout the country, although the Central Pollution Control Board has tried to harmonise the industries in the three categories.

The environment ministry is of the view that the present system does not take into account sector specific plans for controlling pollution and instead classifies industries and industrial activities on the basis of size, manpower and consumption of resources.

The view in the ministry is that pollution parameters and their impact on health are not considered primary criteria in this classification. The ministry has proposed that no red-category industries will be permitted to set up units in urban, eco-sensitive and protected areas.

The classification of industries will be undertaken by a team comprising officials from the central pollution board, state boards and the ministry.

SAFETY WORKSHOP

A Safety Workshop was conducted on March 4, 2015 as a part of **Chemfluence'15** in Alagappa College of Technology, Anna University. Nearly 80 students from various colleges participated in the workshop. The main focus for the workshop was to understand, analyse the current safety scenario and action to be taken to improve safety and to reduce the risk in chemical industries. The students have gained good knowledge in various topics such as safety in chemical industry present and future; safety considerations from design to disposal; hazard identification and risk analysis; disaster management and control by Mr W A Balakumaran, Mr R Parameswaran safety professionals both from Safety Engineers Association (India) and Miss T Santhoshini Priya, Assistant Professor, Department of Chemical Engineering, Anna University. And also the students were asked to analyse and present their findings on the case studies which were given to them. The evaluation of the analysis was done by the chief guests, Mr S Ulaganathan, President, SEA (India) and Mr GMEK Raj, Adviser, SEA (India). The team which gave the best analysis of the case study was selected as "BEST SAFETY TEAM". Prizes and certificates had been distributed to the participants at the end of the day.

Faculty & Participants at the Safety Workshop at Alagappa College of Technology, Anna University, Chennai on the Safety Day, March 4th 2015.

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