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15TH ANNIVERSARY CELEBRATIONS OF SEA (INDIA)



Mr P Bose, Director, Industrial Safety & Health, Govt of Tamilnadu delivering the Keynote Address at the 15th Anniversary Function of SEA (India) at Chennai, held on 28th May 2016.

Safety Engineers Association organized their 15th Anniversary celebrations at Chennai on 28th May 2016.

Mr. P. Bose, Director, Industrial Safety & Health, Govt. of Tamil Nadu was the Chief Guest and he congratulated safety engineers and the Members of SEA on the occasion and appreciated their support and contributions extended to the industry.

Mr. Sreenivasan Jayaganapathi, Sr. General Manager, Brakes India, Sholingor, in his Keynote address identified the areas where Safety Engineers Association can help the industry imparting training to their personnel and assist in identifying hazards and carrying out Risk Assessment in their operations.



L - R: Mr S Ulaganathan, President, SEA (India); Mr Sreenivasan Jayaganapathi, Sr General Manager, Brakes India Ltd.; Mr P Bose, Director, Industrial Safety & Health, Govt of Tamilnadu; Dr S Kalaiselvam, HOD, Applied Science & Technology, Anna University; Mr R Sriram, Secretary, SEA (India)

Dr. S. Kalaiselvam, HOD, Applied Science & Technology, ACT Campus, Anna University delivered a Special Address and he informed that his students undergoing PG Course in ME (Industrial Safety) have joined Safety Engineers Association as Student Members and are very much benefitted in getting

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15th Anniversary...

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necessary guidance and support from professionals experienced in industrial safety. He appreciated SEA (India) for organising different programmes that are directly useful to their students and thanked them for the same.

Earlier, Mr. S. Ulaganathan, President, Safety Engineers Association in his welcome

address elaborated the activities of the association and suggested the need for imparting safety training to safety supervisors, safety stewards and safety committee members. He offered that Safety Engineers Association can take up the work, if requested by appropriate authorities. Mr. R. Sriram, Secretary, SEA proposed Vote of Thanks.

On the eve of the Fifteenth Anniversary celebrations, Special Technical lectures were delivered by Mr. V. Sivaraman and Mr. M. Lakshminarayanan, on "Role of PCRA on Energy Conservation" and "Integrating HSE Aspects During Different Stages of Project Management" respectively.

ANNUAL GENERAL BODY MEETING



Fifteenth Annual General Body Meeting was held on 28th May 2016 after the Anniversary Function. The list of New Office-bearers and Executive Members elected are:

OFFICE BEARERS

President: **Mr. S. Selvaganpathy**, Head of HSE Dept., L&T Construction Service, Chennai
Vice President: **Mr. R. Siddharthan**, Joint Director of Industrial Safety & Health, Chennai
Secretary: **Mr. S. M. Ravi**, Head EHS, EHVSS & IE Segment, PTD, L&T Construction, HQ, Chennai.
Joint Secretary: **Mr. R. Parameswaran**, Dy. Chief Inspector of Fact. (Rtd), Chennai - 600 017
Treasurer: **Mr. G. Varadarajan**, HSE Manager of IPL, Chennai.
Ex Officio: **Mr. S. Ulaganathan**, Past president SEA (India)

EXECUTIVE COMMITTEE MEMBERS:

Mr. M. Ravichandiran, Safety Consultant, Chennai - 600 004
Mr. Perumal Manoharan, President-HSE, Sanmar Group, Chennai - 600 086
Mr. G.S. Swaminathan, Brakes India Limited, Chennai - 600 050
Mr. P. Subramani, Safety Consultant, Chennai - 600 050
Ms. Chellamal, MTL Instruments Pvt Ltd., Chennai - 600 119
Mr. Sonny George, Consultant for Fire Safety
Mr. Srinivasan, CEO, Everlife Fire Safety Systems Pvt. Ltd.
Mr. N. Jayachandran, HSE Consultant
Mr. Namasivayam, AGM & Head - Fire & Safety, DLF Cybercity, Chennai
Mr. N. Devendiran, Chief Manager-EHS, Piramal Enterprises Limited, Ennore

INTEGRATING HSE ASPECTS DURING DIFFERENT STAGES OF PROJECT MANAGEMENT

Mr M Lakshminarayanan, Senior Project Manager (Retd), GASCO, Abu Dhabi, UAE delivered special technical talk during the Fifteenth Anniversary function of SEA (India) at Chennai held on 28th May 2016. A gist of his talk is given below for the benefit of SEA members who could not attend.

Introduction:

The objective of this document is to highlight the need of integration / involvement of HSE (Health, Safety and Environment) during different Phases of the project.

Projects pass through different phases from initial conceptual to completion prior to go on production.

1.0 Conception and initiation:

The project proposed has to be carefully evaluated to ascertain the techno economic feasibility and necessary approval has to be obtained to proceed further. On getting the approval and budget, company has to identify a team of experts (Project/Process/Safety/Maintenance) to form a Project team.

A project plan with the project scope shall be developed, called Statement of Requirements (SOR), outlining the work to be performed including BEDD (Basic Engineering Design Data), a budget, schedule, and determine what resources are needed. This SOR shall be written in line with the Company standards, HSE policy, Government Norms & Regulations and international standards.

This SOR shall become the base document for the scope of work for bidding and hence any change thereafter will lead to financial and Schedule impacts affecting the LSTK (Lumpsum Turn Key) projects.

Therefore it is very essential to integrate the HSE personnel right from this stage of project to ensure that the HSE principles and requirements are incorporated properly to design a

safe, Operable and economical facilities.

This SOR in addition to project contractual requirements shall cover all the HSE and Process requirements including various Process and Safety studies required to identify the risks to be mitigated by design.

Some of the SOR contents

HSE Plan:

FEED (Front End Engineering and Design) Engineer and the EPC (Engineering Procurement and Construction) CONTRACTOR shall submit to the COMPANY the HSE Management System and a structured PROJECT HSE Plan within specified number of days from the effective date of award of contract for COMPANY review and acceptance. (Normally 60 days) Full details on the HSE Plan shall be provided in respective exhibits of the project deliverables.

HSE Resources:

FEED Engineer and the EPC CONTRACTOR shall ensure that adequate resources, both personnel and financial, are allocated to the PROJECT to ensure the implementations of HSE requirements as per the SOR.

HSEMS. (Health, Safety and Environmental Management System):

HSE Management System for Health, Safety and Environmental Protection must be compatible with the HSE Management System approved by the COMPANY. The objective of the HSE Management system is to meet the requirements of the HSE policy and to reduce risks to

the PROJECT in all its phases, including the operations phase to the level of ALARP (As Low As Reasonably Practicable).

BEDD (Basic Engineering Design Data):

This document is prepared by compiling the earlier project data, lessons learned from the previous projects, feed (Raw material) and product information. All system requirements are to be clearly written down indicating the relevant standards.

2.0 FEED (Front End Engineering and Design):

Integration of HSE during FEED ensures a seamless transition to the subsequent phases of the project.

Example of Activities during FEED phase involving HSE:

HSE Analysis:

- Execution Strategy
- Location Specific factors
- Regulatory Requirements.
- Logistics & Transportation of Personnel and equipment Movement
- Develop HSE Management system

Process Hazard Analysis and Process review:

- Plot plan /Plant Lay out (3 D Modeling)
- HAZOP (Hazard and Operability)
- LOPA (Layer of Protection Analysis)
- SIL (Safety Integrity Level)

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Integrating HSE

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- Hazardous area classification.

3. EPC (Engineering Procurement and Construction) and

Commissioning:

FEED shall be verified and endorsed by EPC Bidders certifying that FEED carried out is adequate to carry out the detailed Engineering and the successful EPC CONTRACTOR is responsible to ensure that all FEED, PDR (Project Definition Report) are complied with.

HSE deliverables and activities:

HSE deliverables and activities for a PROJECT shall include, but are not necessarily limited to:

- HSE Management System
- HAZID (Hazard Identification) Studies
- HAZOP (Hazards and Operability) Studies
- SIMOP (Simultaneous Operations Studies)
- QRA (Quantitative Risk Assessment Studies)
- SIL (Safety Integrity Level Studies)
- (RAM) Reliability, Availability, and Maintainability Study
- Hazards and Effects Register
- HSE Decisions Dossier
- Construction Job Analysis
- Register of Safety Related Devices
- Environmental Report
- Construction Environmental Control Plan

(HAZID) Hazard Identification Studies:

HAZID study shall be conducted during the FEED phase and EPC phase for identification of hazard.

HAZID is a part of the HSE deliverable in a project. The detailed Hazard Identification Study will not be restricted to the design and operational phases only, but will also cover early works, preparation, construction, commissioning, transportation, installation and abandonment phases of the project.

The PFD (Process Flow Diagrams), Plot Layouts and related document will be reviewed prior and during HAZID review to:

Check the design and ensure that any Hazards which may occur may cause a risk to people working on the installation or to the general public or to plant and equipment. Check whether the precautions proposed in the design are sufficient to either prevent such hazard occurring or reduce any consequence to an acceptable level.

Consider any safety interfaces, which exist with other installations (where hazardous interactions may occur between the deliverables of the new Project and an existing project, then the HAZID should also identify changes of hazard to the existing project.

These will be reviewed by the process and safety expertise along with the other discipline experts.

The resultant HAZID Report shall clearly list all the recommendations and identify assigned parties responsible for any action. It shall be the responsibility of the assigned parties to resolve the recommendations made and to advise the HAZID team leader and/or Project HSE Manager, how that recommendation has been implemented and resolved.

When all recommendations have been resolved the HAZID team leader and/or the Project HSE Manager shall update and re-issue the

HAZID report for Close-Out clearly identifying the action taken against each recommendation.

HAZOP (Hazard and Operability) Studies:

HAZOP studies are carried out to check and investigate the design of the facilities, in order to identify any potential hazards and operability problems that could arise particularly through deviations from the design intent. This will be done in both FEED and EPC phase after the Process and Utility P&ID's and Cause and Effect drawings have been approved .All The PID s are to be approved for HAZOP study. There are many other relevant documents are to be completed, approved and kept ready for the HAZOP.

Example of documents required for carrying out the HAZOP:

PFD Process Flow Diagram.PID (Piping and Instrument Diagram).PSFD. (Process Safeguarding Diagram). C&E (Cause and effect Diagram). H&M (Heat and Material Balance).

Operating Procedures.(including start-up , shut-down) and maintenance manuals.

Engineering design data sheets for all plant items, including vendor's packages.

Design Basis.

Control Narratives, Safe guarding Narratives,

VENDOR Package, their Piping and Instrument Diagrams,

Schedule of alarm and trip settings

Equipment and main piping layout and elevation drawings,

Full description of interlock and shut-down system and valve logic sequence chart including ESD (Emer-

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gency Shut Down) / EDP(Emergency Depressurization.

MSDS (Material Safety Data Sheets) indicating Physical and Chemical properties of all process materials, chemicals and intermediates, especially hazardous properties.

F&G (Fire and Gas) system and layout drawings.

Some of these documents may not be available for reference during the FEED HAZOP review and some may have only Part of the information for the FEED HAZOP. They will be listed in the procedure. Refer to standard HAZOP procedure for the full details. All must be made available for EPC HAZOP

Normally this HAZOP will be carried out by a third party chairperson involving EPC CONTRACTOR and Company Personnel.

SIMOPS (Simultaneous Operations) Studies:

Identify any Simultaneous operations (SIMOPS) and interaction to occur between major activities and the design and construction intent is to carry out these activities concurrently.

To identify the additional levels of risk introduced by simultaneous operations,

To assess the acceptability of additional risks and to identify risk reduction methods that should be built into the design and operational controls.

Findings and recommendations from the SIMOPS studies will be used to develop the PROJECT simultaneous operations procedures.

QRA (Quantitative Risk Assessment):

Project activity shall ensure that Quantitative Risk Assessment's (QRA's) are undertaken or updated.

Major risk contributors are identified & recommendations required are suggested.

Any assumptions made must also be detailed in accordance with COMPANY guidelines.

SIL (Safety Integrity Level) Assessment:

EPC CONTRACTOR shall undertake SIL studies as required to assess the reliability of control systems. Normally this is carried out after implementing the HAZOP final recommendations.

EPC CONTRACTOR's procedure for the undertaking of such assessments shall be generally based upon the qualitative method (Risk Graph) described in IEC 61508 - Part 5, and 61511 "Functional safety of electrical / electronic / programmable electronic safety-related systems.

FEED SIL study should be validated during the SIL study in EPC phase.

RAM (Reliability, Availability, and Maintainability) Study:

EPC CONTRACTOR shall undertake RAM studies as required to assess the overall reliability and availability of process systems.

HSE Hazard and Effects Register:

The HSE Hazard and Effects Register shall provide a formalized record of all the HSE related actions derived from the design development process, and those which are placed on Project through recommendations generated from internal and external reviews and other audits.

The Register will record the recommendation or query against a unique number and the subsequent Project response and action and formalized references to close out. Responsibility for Project action will be identified along with target completion date.

No action shall be closed out until the action is completed, with supportive documentation.

EPC CONTRACTOR shall continue to develop the HSE Hazard and Effects Register provided by the FEED Engineer. EPC CONTRACTOR shall ensure that those actions identified for closure by EPC CONTRACTOR (as identified in the Register carried over from FEED) are addressed and closed out in accordance with the above criteria.

HSE Decisions Dossier:

An HSE Dossier shall be created and kept up to date. This dossier will detail the decision-making processes for all significant HSE related issues covered during the project life, and will include the formalization of all the practicable options considered.

This document will therefore form the basis for the ability to demonstrate that the risks to personnel from design related hazards have been reduced to As Low As Reasonably Practicable (ALARP) for the development.

The dossier will be kept up to date for inclusion in the final Project handover documentation. Adequate procedures shall be put in place to ensure that all discipline engineers create, maintain and provide all relevant HSE related information for the dossier. The execution of these procedures shall be audited internally on a regular basis.

Construction Job HSE Analysis:

Before undertaking any activity, EPC CONTRACTOR will execute a Job HSE Analysis, to ensure that all work permits required for performing the work are ready in hand, all personnel involved are aware of the hazards and associated actions, and the job is adequately supervised.

Register of Safety Related Devices:

EPC CONTRACTOR shall prepare a Register of Safety Related Devices. The Register will provide a dossier of technical information for those protective devices including but not

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necessarily limited to the following types of devices:

- Pressure Relief valves
- Thermal Relief valves
- ESD (Emergency Shut Down) / EDP(Emergency Depressurization) valves
- Rupture/bursting Discs
- Vacuum Breaking Devices

All such devices are those which are directly designed and installed to safeguard and provide ultimate protection for that equipment while crossing outside of their normal design/operating envelopes.

Reference may be made to other documents for details of set points, operating pressure etc.

Environmental Report:

Environmental Report shall be prepared at the end of FEED and EPC phase with the details of implementation of specific design requirements and HSE requirements.

- Full compliance with all Company guidelines as a minimum.
- No routine flaring other than purge and pilot gas.
- Optimization of power requirements.
- No discharge to atmosphere from process facilities.(Gas/Liquid)
- Design to minimize fugitive emissions.
- No utilization of ozone depleting substances.
- No discharge of off-spec water to land.
- No discharges of oil or chemicals to land.
- Minimization of waste generation.
- Optimization of facilities to reduce environmental impacts.

- Minimization of visible impacts, noise and odor.

The Environmental Report shall show how the HSEIA recommendations have been incorporated into the PROJECT design by the FEED Engineer and EPC CONTRACTOR.

Construction Environmental Control Plan:

EPC CONTRACTOR shall prepare and implement a Construction Environmental Control Plan to minimize the adverse impact of construction activities on the environment. The Plan shall apply to all construction activities and applicable locations throughout the work areas associated with the Project. The Plan shall reflect the findings of the HSEIA and include but not be limited to the following contents:

- Spill prevention and response
- Waste management
- Dust control
- Air quality
- Traffic
- Noise and vibration control
- Sustainability and the local economy
- Training
- Environmental Monitoring.

Other Deliverables:

Other studies that are undertaken in the project include, but are not limited to:

- Ergonomics Study
- FRA (Fire Risk Analysis)
- Active/Passive Fire Protection Assessment
- Flare Radiation and Noise Study

EPC CONTRACTOR shall undertake further studies as necessary to show that risk levels are reduced to ALARP.

Performance Monitoring, Recording and Control:

EPC CONTRACTOR shall ensure that there are adequate HSE proce-

dures, standards and operating procedures to manage HSE.

EPC CONTRACTOR is to undertake appropriate HSE performance recording, reporting and control systems. Monitoring shall include, as a minimum:

- Accident and incident reporting and investigation (including near misses)
- Sickness absence and medical treatment recording
- Waste management records
- Fuel usage

Control systems shall include as a minimum:

- Permit to Work procedure,
- ERP (Emergency Response Plan / Procedures) (Including Environmental Response)
- HSE supervision procedures,
- HSE inspection procedures and schedules,
- Internal HSE audit procedures and schedules, sub EPC CONTRACTOR HSE performance and control systems and training.

Construction HSE Activities Examples:

Ensure that all personnel wear proper personal protective clothing and equipment at SITES and when completing specific tasks such as chemical handling, vessel entry, catalyst loading, etc. All personal protective clothing is to be to COMPANY standard.

Set up an accident/incident investigation/reporting procedure in line with company Guidelines and ensure that corrective actions to prevent recurrence of accidents are implemented.

Assist COMPANY in handling claims for accidents sustained by employees of third parties working on

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ROLE OF PCRA IN ENERGY CONSERVATION MEASURES IN INDIA

Mr V Sivakumar, Ex Director, PCRA Chennai delivered special technical talk during the Fifteenth Anniversary function of SEA (India) held on 28th May 2016 at Chennai. A gist of his talk is given below for the benefit of SEA members who could not participate.

Indian Petroleum Sector:

Petroleum as a Fuel has revolutionised our day to day life. As a source of energy for Domestic, Industrial, Transport, Agriculture and Commercial establishments, it has become the Vital Energy Resource (lifeline) to India as a Developing Nation.

The Petroleum Industry in India stands out as an example of the strides in its march towards economic development. In 1947, the Petroleum Industry was controlled by International Companies (like Shell, Mobil, Caltex, Esso etc).

After India won independence in 1947, the new government naturally wanted to move away from the colonial experience which was regarded as exploitative. In terms of economic policy this meant a far bigger role for the state. This resulted in a focus on domestic industrial and agricultural production and consumption, a large public sector,

economic protectionism, and central economic planning.

Government of India entrusted the responsibilities on The Ministry of Petroleum and Natural Gas (MOP&NG). This Ministry is responsible for exploration, production, refining, distribution, marketing, import, export and Conservation of Petroleum, natural gas, petroleum products.

Under this Ministry, the effective Governance of following major oil Corporations/ Industries is kept:

Oil & Natural Gas Corporation Limited (ONGC); Oil India Limited (OIL); Indian Oil Corporation Limited (IOCL); Bharat Petroleum Corporation Limited (BPCL); Hindustan Petroleum Corporation Limited (HPCL); Gas Authority of India Limited (GAIL) etc.

The Petroleum Products, mainly are LPG, Kerosene, Petrol, Diesel, Fuel Oil, Lube Oils. In addition Petroleum

becomes a base stock all Petro Chemicals which in turn gets converted to innumerable Products like Plastics, Polymers etc. Petroleum, in the form of Liquefied Petroleum Gas plays a main role in House hold, slowly replacing all other fuels like Kerosene (a Petroleum Component), Wood and Coal.

Consumption of Petroleum:

Way back in 1947, the Indian Petroleum consumption was as low as 27 Lacs Metric tonnes (2.7 Million Metric Tonnes - MMT). The Consumption kept on increasing due to more people had access to use and by 2008-09 the Consumption was 140 MMT (14 Crore Metric tonnes). Beyond 2010, by 2014-15 the Consumption stands increased to 240 MMT (24 Crores Metric Tonnes). The consumption rate of increase is galloping and expected to reach more than 250 MMT (25 Crores Metric Tonnes) by 2020 and beyond.

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PROJECT, Enforcing HSE regulations, Maintaining HSE records.

Report to the COMPANY the status of planning and implementation of activities to ensure safe construction and operation of the PLANT.

Review the EPC CONTRACTOR HSE Management System objectives and targets, ERP (Emergency Response Plan) which will be discussed and agreed with COMPANY.

Project performance and control:

Actual Project progress will be compared to the plan to advise any necessary correction (additional resources) to keep the project on track.

Project close out:

Safety walk thru are conducted during completion of the construction and early commissioning stages. After project tasks are completed and the client has approved the outcome, again a safety walk through is conducted involving Safety personnel to identify any gap and they are listed as PUNCH items.

They are classified and rectified prior to issuance of PAC (Provisional Acceptance Certificate) and FAC (Final Acceptance Certificate).

Conclusion:

It is evident from the project developments briefed above, that integration of HSE at early and every stage of the project shall bring out not only a safe, sound operable project but also ensures the safe, flawless commissioning, startup and completion of the project to achieve the HSE goal of "NO HARM TO PEOPLE and ENVIRONMENT". ■

Role of PCRA (Contd. from previous page)

Petroleum Price:

All of us are aware, Petroleum is traded as Crude oil in International market. The unit price is of Crude Oil (Tamil - *Katcha Ennai*) termed as 'Dollar/Barrel' \$/bbl. In 1970 the \$/bbl was as low as 2\$/bbl, 1976 - 14\$/bbl and 1979 became 29\$/bbl. This was felt by the then Indian Govt, a Great shock.

The sourcing of Crude oil was done in Govt of India budget. Further the Crude Oil pricing had become a determining factor in Global Market and kept on raising to 31\$/bbl in 2000; 55\$/bbl in 2004 and crossed 50 \$/Bbl by 2005 onwards. The Global market price went out of Control and even reached 100\$/bbl by 2010. However, with Global economics getting affected by various factors (like China Development Slowing Down; USA becoming Self sufficient with Shale Oil technology; Organization of the Petroleum Exporting Countries - OPEC internal competitions) the Crude Price had fallen as low as 40 \$/bbl and now remaining at 45-50 \$/bbl.

PCRA-Formation:

The Petroleum Conservation Research Association (PCRA) is an organization established in India in 1978, under the aegis of the Indian Ministry of Petroleum and Natural Gas, engaged in promoting energy efficiency in various sectors of the economy. It helps the government in proposing policies and strategies aimed at reducing India's dependency on oil, in order both to save money and to reduce the environmental impact of oil use.

Petroleum Conservation Research Association (PCRA):

Petroleum Conservation Research Association (PCRA) is a registered

society set up under the aegis of Ministry of Petroleum & Natural Gas, Government of India. As a non-profit organization, PCRA is a national government agency engaged in promoting every efficiency in various sections of economy. It helps the government in proposing policies and strategies for petroleum conservation, aimed at reducing excessive dependence of the country on oil requirement. Over the years, PCRA has enlarged its role in improving productivity in use of various sources of energy.

PCRA undertake studies to identify the potential and to make recommendations for achieving conservation of petroleum products in various sectors of the economy. It sponsors R&D activities for the development of fuel-efficient equipment / devices and organizes multi-media campaigns for creating mass awareness for the conservation of petroleum products. Fuel oil utilization studies, energy audits, introduction of equipment bank concept, use of energy vans, development of oil consumption norms, model depot projects, driver training programs, workshops/exhibitions, consumer meets, education films/TV spots, hoarding/electronic display, distribution of printed literature, R&D projects are other activities.

PCRA aims at making oil conservation a national movement. As part of its mandate, PCRA is entrusted with the task of creating awareness amongst the masses about the importance, methods and benefits of conserving petroleum products & emission reduction.

To take the message to the people, PCRA uses all possible and effective media for mass communication. These include electronic and press media e.g. TV, Radio, Electronic displays; Press at the National and

State level printed literature for specific target groups; outdoor publicity through Hoarding, Bus panels, Kiosks, Balloons, Banners Tran-sliders etc.

The focus of all the messages is easy to implement and practical conservation tips for the industrial, transport, agriculture & domestic sectors. For effective communication to the target groups in semi-urban and rural areas, messages are made in regional languages. Field interactive programs like seminars, Technical meets, Consumer meets, Workshops, Clinics, van-publicity, Exhibitions, Kisan melas are conducted for dissemination of conservation messages and demonstration of conservation techniques.

To give impetus to the oil conservation movement, PCRA utilizes various platforms like the World environment day, World energy day, various festivals etc.

Over the years, PCRA has developed a number of films, TV spots and radio jingles in various languages for promoting oil conservation. PCRA also publishes quarterly a journal and a newsletter. Active Conservation Techniques (ACT), is a journal containing articles on technology by energy experts. It also brings out successful case studies leading to conservation of energy. The conservation news is an in-house newsletter highlighting the major activities carried out by PCRA in the core sectors.

For the benefit of various target groups of petroleum products, PCRA has developed literature containing simple, ready to implement conservation tips and techniques. Special low cost green leaflets have also been developed to educate the masses on the ill effects of pollution caused due to incomplete combustion and its impact on health. ■

BARRIERS TO EFFECTIVE COMMUNICATION

Communicating occupational safety and health information effectively is crucial to preventing employee injuries and illness. But how can you be sure your message is getting across?

The below given Safety Training Tips will assist in good safety communications.

Watch out for communication barriers. Unfortunately, numerous obstacles can cause communication to break down. For example:

- If too much information is being communicated all at once, it can be hard for employees to absorb all those different messages at one time.
- If your message lacks clarity, is confusing or ambiguous, what a worker actually hears might be quite different from what you intended to say.
- If expectations are not clearly defined, you may be unpleasantly surprised by the results. It is important to know and express what you expect to happen as a result of your communication.
- If you communicate a safety message without taking the time to listen carefully to the response of employees, the communication is incomplete. Remember, you have to speak and listen for communication to be successful.
- If you don't take employees' concerns and priorities into account, they might not listen to what you have to say.
- And don't forget that effective safety communication always begins with your message. The message is the safety information you want to transfer from your head into the minds and hearts of your employees.
- Before you speak, think carefully about what you want to say. Be as clear as possible about each of the points you want to make.
- Organize your thoughts into a logical sequence for communication.
- Consider your expectations. Do you expect employees to take some action as a result of what you tell them? If so, be sure to be clear about what that action is.
- Keep your communications simple. One safety message at a time, simply and directly stated, is more likely to be heard and understood.
- Be as precise as possible. Use common language and examples to explain what you mean so that you leave no room for misinterpretation.
- Be concise. Say only what needs to be said to get your point across. A lot of extra words will only confuse the issue.
- Demonstrate when appropriate. Employees generally learn better and retain more of the safety information they see and hear.
- Repeat your message as needed. Studies show that a safety message often needs to be repeated on several different occasions to get through to employees.

Why It Matters...

Failure to communicate safety information effectively can have serious negative consequences, including:

- Accidents, injuries, and illness
- Lost workdays
- Reduced productivity and delays
- Risk-taking by employees
- Inability to comply with regulations
- Higher workers' compensation and health insurance costs
- Damage to materials, equipment, or your facility (for example, in a workplace fire caused by carelessness or lack of knowledge)
- Risks to community and environment (for example, in a release or improper disposal of hazardous chemicals)

Think it over!!!!

GUIDELINES FOR SAFELY ENTERING AND CLEANING VESSEL SEWAGE TANKS

(Continued from the Previous Issue)

Note: Other hazards may include inadequate ventilation, poor visibility, and heat stress.

Personal Protective Equipment (PPE) & Other Recommended Safe Practices

- Although Level A or B protective gear is not required, to avoid liquid contact with exposed skin, it is recommended that full-body, impervious suits are worn in addition to using rubber boots, gloves, hard hats and eye protection.



- Respirator selection is based on an evaluation of respiratory hazards in the workplace and other relevant workplace and user factors; however, during entry and cleaning inside a large sewage tank, it is recommended that workers wear full-face, supplied-air respirators with an escape pack.

- During cleaning operations performed outside a tank, where the atmosphere is not Immediately Dangerous to Life or Health (IDLH), wear supplied-air or air-purifying respirator with organic vapor HEPA (High-Efficiency Particulate Arresting) cartridge.
- Have extra flashlights and two-way radios readied for communication.
- Have a first-aid kit, an eyewash and flushing station, neutralizing solutions, cleaning equipment, and emergency medical services readily available.

Immunization

- Ensure routine vaccinations such as for influenza and tetanus are current. Consult your physician about the need for Hepatitis A vaccination (NIOSH/CDC).

Training

Workers must be trained to recognize potential hazards, use proper work practices and procedures, recognize adverse health effects, understand the physical signs and reactions related to exposures, and are familiar with appropriate emergency evacuation procedures. They must also be trained to select and use the appropriate Personal Protective Equipment. Training may also be required in the following areas:

- Confined Space Entry Procedures;
- Atmospheric Testing;

- Calibration of Gas Detectors;
- Respirator Selection and Fit Testing;
- Ventilation and Engineering Controls;
- HAZMAT (Hazardous Materials) or HAZWOPER (Hazardous Waste Operation and Emergency Response)

Atmospheric Testing Requirements for Confined Space Entry & Hot Work

Tank entry must not be permitted if atmospheric conditions are found to be Immediately Dangerous to Life or Health (IDLH). IDLH means an atmosphere that poses an immediate threat to life or is likely to result in acute or immediate severe health effects. Depending on the atmospheric condition,



either a competent person or a NFPA-certified Marine Chemist is required to test sewage tanks prior to entry for cleaning. Sewage tanks and all piping must be tested and visually inspected prior to doing any hot work to confirm that:

- Oxygen levels in the tank and around the work area are maintained between 19.5 and 22.0% by volume;
- Combustible gases are maintained below 10% Lower

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Guidelines

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Explosive Limit (LEL); and

- Hydrogen sulfide gas is maintained at 10 ppm (parts per million) or less.

Control Measures Prior to Tank Opening or Pipe Breaking

- Assess and review CHT (Collection Holding and Transfer) or MSD systems, components and piping.
- Perform jobsite safety and health analyses and be aware of all associated risks and hazards. Inform all workers involved of the risks and hazards determined by the jobsite safety and health analyses.
- Post warning signs and labels .
- Secure all toilets, urinals, drains, pumps, and sewage treatment systems.
- Isolate, close, secure, divert, de-energize, lockout and apply tags-plus applications to all valves, piping and associated equipment
- Strategically place drip pans at pumps, joints, disconnected piping, tank manholes, clean-outs, drops, etc.
- Follow confined space entry testing and permitting procedures. If feasible, use sample ports to test for atmospheric contaminants inside the tank.
- It is recommended that a



Ventilation blower and ducting

- NFPA-certified Marine Chemist or competent person be present when breaching the sewage system, tank, or piping.
- Cautiously and deliberately remove bolts and nuts off manholes and piping, while staying alert to any immediate change of conditions, and be prepared to take necessary action.
- Use appropriate tools and operating procedures.
- Install and use adequate exhaust ventilation devices, ducting, lighting, and tank-cleaning equipment. Immediately following the piping being broken or the tank opened, apply or insert ducting to begin exhaust ventilation. Pipe all exhausts downwind, overboard, or away from people.
- Cover and isolate all work areas with disposable plastic sheeting to prevent possible contamination.
- Flush tanks and piping systems; pump and drain all residual products.
- Check for residual pressure or vacuum effects in tanks and piping.
- While remaining outside the tank, continue to test the atmosphere inside the tank remotely for safe conditions.
- Before beginning tank cleaning operations, while wearing the appropriate PPE, clothing and respiratory protection, cautiously enter the tank for an internal inspection.
- Chlorinate or sanitize the tanks and piping systems when necessary.

Tank Cleaning Procedures

- Perform initial cleaning and any additional pumping or stripping through the opened manhole access.
- Pressure wash, pump-out and remove all loose materials.
- Manually scrape muck or scale and bag all hardened/calcified deposits.
- Perform a second pressure wash and remove any remaining debris before sanitizing all surfaces with bleach or sanitizer.
- Perform final rinses, squeegee, removal, wipe and dry operations.



A cleaned and sanitized sewage tank.

Sewage Disposal

- Dispose of sewage and contaminated liquids, sludge, solids, and all tank-cleaning wastes at local or state-approved treatment facilities.

Post-work Cleanup

- Remove contaminated clothing and bag for proper disposal or decontamination.
- Shower or wash face, arms, hands and legs with soap, using a substantial amount of water.
- Disinfect equipment (e.g., using iodine compounds, bromine, chlorine, ozone, or their equivalent) and wash contaminated spaces, decks and bulkheads with detergent, sanitizer, or bleach. ■

CASE STUDY

CASE STUDY 1:

BOILER EXPLOSION DURING PLANT COMMISSIONING:

Description of Incident

Three workers were trying to restart a steam utility boiler during night shift when an explosion occurred inside the furnace of the boiler. The explosion ripped open the boiler, causing damage to the water tubes and subsequent release of high pressure steam. Two workers eventually died due to severe burns and the third worker was badly injured.

Possible Causes and Contributing Factors

Man

- The workers allowed a large amount of flammable gas into the boiler furnace.
- Investigations revealed that the workers used unauthorised bypass method to restart the boiler.
- The workers had learnt the bypass method from the pioneering boiler start-up team and thought that it could be used again (just like they had done a few times before) to overcome the unsuccessful firing situation they were facing.
- The workers, however, failed to adhere to the safe work procedures as they did not apply for management of change approval before implementing the bypass method, and removed the bypass valve security seal without authorisation.



The steam utility boiler after the explosion

- The workers also failed to carry out risk assessment prior to implementing the bypass method. They had applied the bypass method successfully a few times before and thought it would be alright to continue with the method.

Recommendations and Learning Points

- Emphasise the importance of adhering to safe work procedures at all times.
- Conduct periodic safety briefings and refresher training for all workers involved in boiler operations so that the safe work procedures are clear to all.
- Highlight all deviations from safe work procedures to management for approval prior to any implementation.

Causal Analysis

Evaluation of loss	• Two fatalities and one worker badly injured
Type of contact	• Explosion followed by contact with high pressure steam
Immediate cause(s)	• Presence of flammable gas-air mixture and ignition source in boiler furnace
Basic cause(s)	• Failure to adhere to safe work procedures • Lack of risk assessment for deviations from safe work procedures
Failure of OSHMS	• Hazard identification, risk assessment and risk control • Operating procedures and safe work practices • Management of change

Medium

- The furnace walls were very hot as the boiler had been in operation before it tripped.

Management

- Workers were not specifically advised against carrying out the bypass method practiced by the pioneering boiler start-up team.
- Safe work procedures were not adequately enforced and effectively communicated to the workers.

- Ensure that all deviations (i.e., changes) from safe work procedures are subject to risk assessment prior to implementation.
- Nurture a strong safety culture where workers understand that process changes (whether major or minor) need to be properly managed to prevent a process safety incident.

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Case Study....

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CASE STUDY 2:

FURNACE EXPLOSION DURING TEMPERING PROCESS



The furnace without its door after the explosion.

1. Side shells damaged and exposed the furnace insulation.
2. Door blasted open.

Description of Incident

An explosion occurred at a furnace, used for tempering tubular metal components. Each piece of metal component had earlier been masked with a layer of liquid chemical (a flammable substance) at both its ends. The masking and subsequent drying was carried out by a contractor at his premises prior to delivering it to the client's furnace location. The explosion occurred 25 minutes after the metal components were loaded into the hot furnace. The explosion blasted away the furnace door and caused damages to the sides, top and rear parts of the furnace. No worker was injured in this incident.

Possible Causes and Contributing Factors

Mission

- The work involved tempering of metal components partially masked with a layer of flammable chemical.

Medium

- There was an accumulation of flammable vapour in the furnace due to evaporation of the residual masking chemical from the metal components.

air drying time, switching to a larger furnace, and increased metal component loading on the furnace operation.

Recommendations and Learning Points

Causal Analysis

Evaluation of loss	• Property damage
Type of contact	• Explosion
Immediate cause(s)	• Ignition of the flammable vapour accumulated inside the furnace
Basic cause(s)	• Insufficient air drying time for the masked metal components prior to loading into the furnace.
Failure of OSHMS	• Hazard identification, risk assessment and risk control • Operating procedures and safe work practices • Management of change • Contractors

Machine

- The furnace in use was meant specifically for the tempering process and not suitable for drying the metal components as there was no internal ventilation system to clear away the accumulated vapour.

Management

- The management failed to communicate to the workers and contractors on the safe work procedures and the importance of checking for sufficient air drying time prior to loading metal components into the furnace.
- The management had approved the use of the furnace as it was larger and could accommodate more metal components in line with growing business demand.
- As there was a lack of procedure for management of change, no risk assessment was carried out to determine the impact of shortening the

- Communicate the importance of critical safety checks such as sufficient air drying time or level of dryness to all workers and contractors, and clearly indicate the need for such checks in the safe work procedures. Implement system (e.g., via regular audit) to ensure compliance by all parties.
- Ensure that all changes to the process workflow (e.g., shortening the air drying time, switching to a larger furnace and increased metal component loading) are subject to management of change procedure and process hazard analysis before implementing.
- Select and use the right equipment for the task – in this case, a furnace with an internal ventilation system should have been used so that residual vapours emitted from the heated metal components can be removed effectively.

IN THE NEWS

World Day for Safety and Health at Work

“Theme 2016: Workplace Stress: a collective challenge”

Today, many workers are facing greater pressure to meet the demands of modern working life. Psychosocial risks such as increased competition, higher expectations on performance and longer working hours are contributing to the workplace becoming an ever more stressful environment.

Work-related stress is now generally acknowledged as global issue affecting all countries, all professions and all workers both in developed and developing countries. In this complex context, the workplace is at the same time an important source of psychosocial risks and the ideal venue to address them in order to protect the health and well-being of workers.

The World Day for Safety and Health at Work is an annual international campaign to promote safe, healthy and decent work. It is held on 28 April and has been observed by the International Labour Organization (ILO) since 2003.

28 April has also long been associated with the world's trade union movement's commemoration of the victims of occupational accidents and diseases.

Every year some two million men and women lose their lives through accidents and diseases linked to their work. In addition, there are 270 million occupational accidents and 160 million occupational diseases each year, incurring US\$ 2.8 trillion in costs for lost working time and expenses for treatment, compensation and rehabilitation. Fatalities, accidents and illness at work are highly preventable and we have an obligation to act.

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.

Measures mooted for safe transportation of chemicals

Barges engaged to transport hazardous chemicals should have on board two technical experts with enough experience to deal with emergencies and the barges should be fitted with additional safety appliances.

A meeting of stakeholders organised by the Kerala chapter of the National Safety Council (NSC) here on Saturday to brainstorm about the safe and secured transportation of hazardous chemicals in the wake of the recent ammonia leak from a barge operated for FACT threw up a slew of measures to avoid such accidents in the future. Minister for Labour and Excise T.P. Ramakrishnan inaugurated the meeting. C.K. Soman, chairman, NSC, presided over it.

P. Pramod, director of Factories and Boilers, lamented the difficulties in coordinating with various departments in the event of an emergency.

20-point guideline

Among the 20-point guideline formed at the end of the session was the deployment of a patrol boat when hazardous materials are transported through waterways. A suggestion was made to make the District Collector's office and the District Disaster Management Authority as the fulcrum of mitigation and rescue operations during emergencies with the NSC chipping in with technical assistance.

Police personnel and employees of local bodies need to be trained and given refresher courses in fighting chemical disasters and behaviour of chemicals with the technical assistance of the NSC, the expenses of which should be met by the State government.

Representatives of residents associations urged the NSC to impart training to students and public on the fallout of various disasters.

As far as possible, hazardous chemicals should be transported through pipelines and when transported by other means, a specific time should be fixed for their movement. Trucks carrying hazardous materials should be fitted with GPS and there should be a minimum gap between the operations of two similar trucks on the same route.

Separate roads should be identified for evacuation. Meteorological forecasts should be collected in the event of chemical accidents since the behaviour of chemicals varies depending on atmospheric conditions.

IN THE NEWS

World Environment Day

"On this World Environment Day, I urge people and governments everywhere to overcome indifference, combat greed and act to preserve our natural heritage for the benefit of this and future generations." - Secretary-General, **Ban Ki-moon**

World Environment Day aims to inspire more people than ever before to take action to prevent the growing strain on planet Earth's natural systems from reaching the breaking point. The 2016 theme highlights the fight against the illegal trade in wildlife, which erodes precious biodiversity and threatens the survival of elephants, rhinos and tigers, as well as many other species. It also undermines our economies, communities and security. This year's slogan "Go Wild for Life" encourages you to spread the word about wildlife crime and the damage it does, and to challenge all those around you to do what they can to prevent it.

2016 Theme: Zero tolerance for the illegal trade in wildlife

The booming illegal trade in wildlife products is eroding Earth's precious biodiversity, robbing us of our natural heritage and driving whole species to the brink of extinction. The killing and smuggling is also undermining economies and ecosystems, fuelling organized crime, and feeding corruption and insecurity across the globe.

Wildlife crime endangers iconic elephants, rhinos, tigers, gorillas and sea turtles. In 2011, a subspecies of Javan rhino went extinct in Vietnam, while the last western black rhinos vanished from Cameroon the same year. Great apes have disappeared from Gambia, Burkina Faso, Benin and Togo, and other countries could quickly follow. Lesser-known victims include helmeted hornbills and pangolins, as well as wild orchids and timbers like Rosewood - flowers and timber are also considered wildlife! Learn more about this year's World Environment Day theme.

Host Country: Angola

This year's World Environment Day celebrations are hosted by Angola, a country seeking to restore its elephant herds, conserve Africa's biodiversity-rich wildlife, and safeguard the environment as it continues to rebuild after more than a quarter-century of civil war.

"Angola is delighted to host World Environment Day, which will focus on an issue close to our hearts," said Angolan Environment Minister Maria de Fatima Jardim. "The illegal wildlife trade, particularly the trade in ivory and rhino horn, is a major problem across our continent. By hosting this day of celebration and awareness-raising, we aim to send a clear message that such practices will soon be eradicated."

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