INDIAN SAFETY ENGINEER

SEA (INDIA)
(Regn No: 1391 / 2000)
[Registered under Societies Act, 1975]

QUARTERLY JOURNAL OF SAFETY ENGINEERS ASSOCIATION

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VOL: 15 No. 3 **JULY – SEPTEMBER 2016**

44TH PROFESSIONAL DEVELOPMENT MEET

The 44th Professional Development Programme was held on Sunday, 21st August 2016 at Chennai.

Mr. M. Namasivayam, Head, Fire & Safety, DLF, Cybercity, Chennai delivered a talk on "FORMULATING AN EMERGENCY RESPONSE PLAN".

Large number of SEA India members participated and enriched their knowledge.

Salient topics discussed in this programme are published in this journal for the sake of SEA India members who could not attend this programme.

Inside...

Printed at Sunitha Printers, Chennai – 600 002

FORMULATING AN EMERGENCY RESPONSE PLAN

Mr. M. Namasivayam, Head, Fire & Safety, DLF, Cybercity

In spite of all our advancements in Education, Experience, Technology and application of Engineering Principles in the practices of good design, erection, operation and maintenance in our industrial and commercial activities, 'occurrence of emergencies' cannot be eliminated. Every year we have been facing huge loss of lives and property, which is neither acceptable nor affordable to a developing country like India. Further they indicateour emergency response planning and preparedness status still remains inadequate and inappropriate.

1. Why and how it matters to you?

It has been said "MAN" is the vital asset and weakest link of an organization. It means you are stronger at social activities while fragile in safety compliance.In our modern way of living, by default, we create more hazards than by Nature and we often become victims to our own creations. You can save your life and of others if you understand about your (1) 'armful environment' and (2) the area of your 'unpreparedness' and accordingly equipping yourself with necessary knowledge & skill set to ensure "protective envelope" in handling hazards at any emergency. What else matters most to you than your life? 'Being prepared' should be your life time responsibility and it is your Hobson's choice. Other than you, no one is accountable to your life safety.

2. What are the various threats affects humanlife?

Here I focus on those emergencies related to life threat at work/ living environment, which may be broadly classified into two categories: (1) Manmade and (2) Natural made. Fire, Explosion, Bomb Threat, Terrorist Attack, Fall Hazard, Confined Space Entanglement, Hazards due to objects in motion, Building Collapse, Electrical Shock, Pressure Burst, Radiation leakage, Toxic Gas release, Hazards due to Cryogenic and Chemicals etc. are the few examples of Manmade / Technological hazards. Flash Flood, Earthquake, Cyclone / Hurricane, Landslide, Tornado, Snow Fall, Tsunami etc are the examples of Nature made emergencies. "Hybrid Emergencies" are the result of combination of human fault / technical failure with anthropogenic factors.

3. What is meant by an Emergency?

"In a situation, wherein, occurrence of act(s) or event(s) may have potential likely to cause imminent and serious danger or damage or destruction to life, property and process to those who are the vulnerable subjects of such situation" is termed as emergency. Therefore it warrants immediate response and remedial measures in action at the earliest time possible (known as Response Time) to prevent / reduce losses at a possible extent.

4. What is meant by "Emergency Response Plan"?

Planning is a management function to:

(1) identify objectives / goals in accordance with management safety policy

(2) formulate strategies to achieve those objectives / goals

(3) arrange / create ways and means required for the above purposes

(4) implement, direct and monitor above steps towards completion& compliance

Emergency ResponsePlan means, an "action plan in written form" developed to mitigate the vulnerability of damage / destruction potential that could endanger the people, property and process facilities of an organization.

In other words it is an 'Action oriented Standard Operating Procedure' to establish comprehensive and coordinated approach among the various teams, to ensure effective& timely response measures to reduce the adverse effects upon the safety of people and organization itself by utilizing and achieving optimum balance of demands with available resources.

Emergency Plan may be generic in character but it should be site specific in its applications, selections and accomplishments. The Emergency Plan is classified into two kinds namely (1) On Site Emergency Plan and (2) Off Site Emergency Plan.

4. (A) *On Site Emergency Plan:* 'When the effect of incident is expected to affect people and property within the boundary of the limit', then the emergency management responsibility comes under the site management purview.

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4.(B) *Off Site Emergency Plan:* When the effects of incident is expected to affect people and property beyond the boundary limit, then the incident management control come under the purview of local Regulating Authorities

5. Why an organization should need an Emergency Plan?

The needs are listed below:

1. Insurance cannot and does not cater all the losses
2. It is the moral, social and legal responsibility of any organization to protect the employees against work place hazards in terms of Health, Safety and Environment
3. It has become the integral part of 'Business Continuity Plan'from International Perspective.
4. Gives initial action directions to act in a systematic way without wasting time or waiting for guidance from line management.
5. It helps to identify unrecognised / unidentified hazards, which may aggravate emergency situation upon our emergency response, without giving consideration to such awareness.
6. It helps to identify 'resources available and unavailable' with the organization so as to ensure "Safety Lead Time" in arranging such requirements.
7. It brings light to deficiencies, well before the occurrence of emergency, so as to improve and strengthen emergency preparedness well in advance.
8. It helps to identify the need for skilled manpower, suitable communication setup requirements.
9. It helps to formulate Incident Command System and Coordination arrangements among various teams /groups, both internal and external.
10. It helps to avoid multiple deaths and to promote resilience capacity
11. It helps confidence, generates role clarity and assignment of responsibility to the Emergency Response Team (ERT) members in specific and emergency response awareness to the occupants in general.
12. It helps to preserve / protect valuable documents and vital resources

6. How to formulate an Emergency Plan?

The Goals are very clear and simple: 'Safety of People, Property and Process'.But achieving the goals is a'complicated and continuous task'. Goals are achievable by the effective implementation of three distinctive but integrated strategic methodologies namely:

(1) Pro-action (Incident Prevention) Measures

(2) Pre-action (Protection systems against impacts) Measures and

(3) Reaction (Emergency Response) Measures.

On facing an emergency one has to choose either "Fight" or "Fly" mode, whichever is possible. Even to do 'fly away'; one needs to follow Dos and Don'ts. Emergency Response Plan aims to design human behaviour in a desirable and systematic way so as try to stabilize safety& normalcy in emergency situation. In case normalcy and safety cannot be assured, then evacuation (moving people from the place of danger to the place of safety) has to be made using available exits or by other means of exits to ensure safety to occupants.

6. (A) Emergency Response Plan Formulation - Key Aspects

1. Identification of possible Incident:Hazard identification is a thorough study of the entire site and assessing types of hazards such as Manmade or Natural ones applicable to the site, based on the possibility and probability of occurrence. The factors of consideration are: location, nature of process / business, past history of incidents, type and time of people's involvement, building geometry etc.
2. Vulnerability Assessment: In the next step, one must understand and estimate the possibility of consequence / impact of the event upon the people and the process. Based on the severity and extent of the area, proper suitable mitigation response plans and reaction mechanisms are to be decided and accordingly emergency response action plans must be decided and to be made ready for different contingencies.
3. Identification of Resources: Fire cannot be killedwith empty hands. Based on the vulnerability assessment, focus must be given on various necessary resources required, on priority basis, for managing emergency relevant to site. Few examples of the resources are: Skilled human force, Machines & Equipments, Materials, Exits & Floor Plans (Drawings), Action Plan Documents,

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Training arrangements, Communication & Coordination setups. As resources are cost effective, it is important to have a strategy of identifying "resources within" and "resources outside".

4. Plan Approval: Emergency Plan is essentially an official written document involving critical considerations on the aspects such as Incident Command, Communication Flow, Coordination level, Resources cost provisions, Incident Action Plans, Consequence Management and above all Commitment and Leadership Involvement in implementing safety. So it should have authorization and approval by the competent person / authorities as it required
5. Testing & Revising: Emergency Plan is not and cannot be reliable unless it is practiced and subsequently revised & updated as per the internal and external needs.

7. Emergency Response - Action Plan:

Respond means react. Action Plan is a written instruction about the various sequences of actions, based on the expected consequences of event, to be carried out as per the approved standard / procedures/ direction. Listed below is the model action plan, in case of fire incident, for your reference:

1. Respond to the incident spot on receipt of Fire Alarm / Call.
2. Stabilize the incident by using the "resources within".
3. If stabilized, set right 'fire alarm system' into normal working mode and send report for further investigation.
4. If incident cannot be managed by internal resources, send information to effect multilevel information as per the plan, which may include location of fire, likely fire spread situation, and people involvement, type of assistance required etc.
5. Start rescue /fire fighting / smoke venting activities, whichever is applicable, using 'resources within' till external team arrived.
6. Declaration of Emergency (along with sound alert) by Incident Head and call for Evacuation(Partial or Full Scale) and summon for ERT assistance.
7. Establishment of Forward Operation Centre [FOC] and communication setup and alert information to neighbours as if required.
8. Call for external assistance.
9. Support Traffic Control and Cordoning of incident area and close main entry if required.
10. Assisting /supporting evacuation of occupants especially differently able people and guiding them to safe assembly area.
11. Confirm completion of evacuation, look for any missing person and if any start Search and Rescue as possible.
12. Provide coordination and necessary information and support to external agencies like Fire, Police and other departments.
13. Do pass necessary information to the gathering by using PA System and help information to their relatives in case of injured or affected ones.
14. Ensure medical aid or arrange Ambulance for further ailment if any.
15. Auxiliary power supply, power & emergency disconnect, Fire Pump operation, Assembly Area Assistance, Redundancy Communication, Logistic arrangements including PPE, Welfare needs and any assistance required by FOC etc should be taken by respective Emergency Response Team members as per the plan assignment.
16. After extinguishment of fire / rescue activity and on the advice by the experts concerned and after assessing the site condition in respect of water, power and air supply and other hygiene aspects, Head will announce "All Clear" or "Go Home" signal.
17. Regulate the 'inflow' crowd into building
18. Conduct Debriefing for feedback compliance.
19. Arrange corrective actions on fire fighting systems and ensure defective equipments removed from the use
20. Complete Documentation and send report for Fire Investigation.

8. Emergency Preparedness:

Emergency preparedness is a long term process of capacity building in terms of sharpening operational efficiency, increasing organizational capability and resilience capacity to manage any type emergency in a systematic and effective manner to achieve protection to people and property.

8.(a) Key Elements of Emergency Preparedness:

1. Incident Reporting System
2. ERT formation and Role

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CHECK LIST SUGGESTED FOR SAFE GUARDS AGAINST A CYCLONE / FLOOD FORECAST

Carry out the following precautionary actions during the anticipated cyclone / flood:

1. Check whether all the underground storage tank covers are closed and arrange for fixing bolts for the covers if missing.
2. Arrange for properly sealing all the containers which are lying in the open area to avoid water entry. As far as possible, arrange to move the materials inside the building. If not possible cover them with a tarpaulin or other suitable cover.
3. Keep the effluent system in working condition and ensure effluent does not overflow in the ground.
4. Check whether any alternate power supply is available to run the effluent system.
5. Check all the effluent drains and storm water drains and ensure for free water flow.
6. Keep all the water sensitive chemicals inside the building and properly covered.
7. Be prepared for an emergency plant shut down.
8. Identify the number of torch lights required and keep them in working condition.
9. Close all the windows and doors which can be kept closed
10. All plant personnel and others moving inside the site are to be regulated to wear safety helmet even in 'non-helmet' areas to protect against any flying / falling object.
11. Ensure that all the tonners / cylinders and mobile equipments are properly chained / supported to avoid rolling/moving.
12. All the log books/ documents are to be kept in a safe place to protect from rain water.
13. Ensure the availability of adequate stock of raw materials within the plant, to avoid frequent personnel movement outside the plant.
14. Nominate a person to monitor the trend of cyclone / rain with the help of Radio, TV, Meteorological department , internet etc. and inform others.
15. Review the food requirements of the persons inside the site.

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assignments as per the Emergency Plan requirements.

3. Periodical and need based training.
4. Testing and evaluation of training.
5. Identifying mitigation / protection resources and procuring the same in time.
6. Identifying resources at "outside premises" and plan of arrangement in case of need.
7. Periodical care & maintenance of protection devices, safety systems and equipments including PPEs.
8. Establishing &improving communication systems.
9. Ensuring and improving coordination level among various ERT Members and external level.
10. Establishing Emergency Control Centre equipped with communication setup, emergency contact details, Incident Control and Command system.
11. Traffic Aid and Medical Aid care and arrangements.
12. Government, Public and Media Relation Centre.
13. Consistent Mock Drill Practices and Documentation.

9. Conclusion:

Prevention of loss is not only more human than cure; it is also much cheaper, for accidents are more costly and painful. Your birth is not your option but it was offered from your parents as one time & wonderful gift; so "Lead your life by choice and not live by chance". The need of the day is realistic, relevant Plan and regular Preparedness'. Planning and preparing through "Rear View Mirror" cannot be realistic at all scenarios for the fact; there will always be "more could have been done" when responding to particular incident or disaster.

Let us learn more to live and more to help India safer. ■

Check List ....

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16. Make necessary arrangements to evacuate the employees in case of emergency.
17. To make arrangements to stock adequate drinking water.
18. Potable water tank to be kept full.
19. Ensure adequate stock of emergency medicines.
20. Keep the ambulance in ready condition
21. Form an 'Emergency Task Force' or activate the Emergency Task Force as per the onsite Emergency Plan to take care of the situation in case of cyclone emergency.
22. If the information regarding cyclone is known after general shift hours or during Sundays / factory holidays, depending upon the need, arrange to call the necessary Emergency Task Force members to the site to take precautionary measures as discussed above.
23. If the situation warrants, make arrangements, so that some members of the emergency task force are available in the site, round the clock.
24. Arrange to remove all the temporary structures and scaffoldings, if required.
25. Arrange to stop all the work being done at heights / roofs
26. As far as possible engage minimum number of contract personnel during warning period and bare minimum during cyclone impact period.
27. Keep the windows and ventilators in tight shut position to avoid breakage of glass.
28. Arrange to remove / repair the windows / ventilators which are hanging improperly or which could not be closed tightly.
29. Go around your area of operation and look for hazards like loosely hanging roof, damaged asbestos sheet, pipes and structures which are not fixed properly, etc. and take corrective measures. If corrective actions are not possible immediately, barricade the area to keep away the people.
30. Equipments / materials kept on the floor and which could move due to cyclonic winds are to be properly supported / fixed.
31. To arrange for / use the portable diesel pumps to reduce the water levels in the critical areas.
32. If the regular Occupational Health Centre is water logged, arrange to establish a temporary OHC in one of the offices in the main office building.
33. All the events during the cyclone / flood are to be logged in details for future reference.
34. Consider the requirement and availability of the following:

- Portable diesel pumps
- Diesel (Required quantity)
- Ladders
- Buckets
- Gum boots
- Towels
- Soaps
- Raincoat
- LPG Cylinders
- Milk powder
- Vegetables
- Groceries
- Bread & Butter
- Bed sheets
- Toothpaste / Toothpowder
- Torch Lights
- Torch Cells
- Tarpaulin Sheets
- Gloves
- Goggles
- PVC suit
- Umbrellas

Set up a cross functional team to carry out a survey of the plant with reference to the above points and take necessary actions. ■

USING PORTABLE GENERATORS SAFELY

Many facilities use a backup or emergency generator to continue operations in case power is lost. In many cases, it is a portable generator. As useful as they are, portable generators can be hazardous to workers unless they are maintained and operated properly.

Potential workplace hazards associated with portable generators include shocks and electrocutions, fires, carbon monoxide (CO) inhalation, and noise. Here are some tips for avoiding these hazards when your workers are operating portable generators.

Prevent Shocks and Electrocutions

Take these precautions to avoid shocks and electrocutions when using portable generators.

- If you are attaching a generator directly to the electrical system of your facility or one of its structures (e.g., an on-site trailer), always ensure a qualified electrician has installed a transfer switch on the generator. This will ensure that the wiring system does not energize at great distances, which can put utility workers and others in the area at risk for electrocution.
- If you plug an appliance directly into the generator, use the manufacturer's supplied cords or extension cords that are grounded. Make sure the cords are not damaged in any way. Do not use underrated cords.
- Do not overload a portable generator.
- Use Earth Leakage Circuit Breakers (ELCB), especially where electrical equipment is used in or around wet or damp locations.
- Make sure the generator is properly earthed and that the earthing connections are tight.
- Keep the generator dry. If you need to use it in the rain, provide a canopy. Keep the generator elevated in flood situations. Don't mess with the electrical components of a generator if you are wet or standing in water.

Prevent Fires

Generators become hot while running and remain hot for a long time after they are shut down. Fuels used in generators can ignite when spilled on hot parts. Take these precautions to avoid fires with your portable generator.

- Before refueling, shut down the generator, and let it cool.
- Store and transport generator fuels in approved containers that are properly designed, marked, and vented.
- Keep the fuel containers away from the generator.
- Do not smoke around the generator or the fuel containers.
- Inspect portable generators for damage or loose fuel lines that may have occurred during transportation and/or handling.

Prevent CO Inhalation

CO is colorless and odorless, and therefore there is no warning when the toxic gas builds up in an enclosed space. Take these precautions to avoid CO poisoning.

- Never use a generator in an enclosed space. Open windows and doors may not prevent the buildup of CO.
- Make sure the generator has 3 to 4 feet of clear space on all sides and above it to ensure adequate ventilation.
- When outdoors, do not place a portable generator near doors, windows, or vents because the CO could enter the building.
- If anyone shows symptoms of CO poisoning, e.g., dizziness, headaches, nausea, or tiredness, get to fresh air immediately and do not reenter the area until it is determined to be safe by properly trained and equipped personnel.

Prevent Noise and Vibration Hazards

Generators vibrate and are noisy. Excessive noise and vibration can cause hearing loss and fatigue and can affect job performance. Take these precautions to avoid noise and vibration hazards when using portable generators:

- Keep portable generators as far away as possible from work areas and gathering spaces.
- Ensure that all workers who work with or near generators wear hearing protection. ■

IMPACTS OF AMMONIA

Ammonia is a common naturally occurring substance. It is also manufactured by man. At normal environmental conditions, pure ammonia is a colourless, pungent-smelling, caustic (corrosive) gas. It is stored under high pressure as a liquid. It is highly soluble in water and reacts with acids to form ammonium salts.

Ammonia is used in a variety of ways: for bleaching or cleaning, in the production of fertilisers, plastics, pharmaceuticals, rubber and petrochemicals and as an anti-fungal agent for foodstuffs.

Environmental Impacts

When in gaseous form, ammonia has a short atmospheric lifetime of about 24 hours and usually deposits near its source (the majority of gaseous ammonia is depositied within 700-1000 m of feedlot perimeters. In particulate form ammonia can travel much farther impacting a larger area. Both gaseous and particulate ammonia contribute to eutrophication of surface waters, soil acidification, fertilization of vegetation, changes in ecosystems, and smog and decreased visibility in cities and pristine areas.

Since ammonia is one of the only basic species in the atmosphere, it readily reacts with strong acidic species in the atmosphere such as nitric and sulfuric acids, which are byproducts of combustion process including vehicle and industrial sources, to form ammonium salts, also known as fine particulate matter.

Due to their small diameter (less than 2.5 microns (μm)) and increased atmospheric lifetime of 15 days, these particulates are able to travel long distances before being dry or wet deposited to the ground surface. This allows them to travel from rural areas to urban locations where they mix and build up in the atmosphere, leading to smog or transportation to other areas. In Colorado transport of these particulates from urban areas to pristine mountain regions, such as Rocky Mountain National Park, has been documented. Deposition of these N rich particulates in the Park has caused changes in the Park's vegetation, lakes, and natural ecosystems.

Eutrophication

Eutrophication is a result of nutrient pollution (from deposition or run-off) into natural waters (creeks, rivers, ponds, or lakes).

Eutrophication generally promotes excessive plant growth and decay, favors certain weedy species over others, and is likely to cause severe reductions in water quality. In aquatic environments, enhanced growth of choking aquatic vegetation or algae blooms disrupt normal functioning of the ecosystem, causing problems such as a lack of oxygen in the water, needed for fish and other aquatic life to survive. The water then becomes cloudy, colored a shade of green, yellow, brown, or red.

Soil Acidification

When ammonia reaches the soil surface, it usually reacts with water in the soil and is converted into its ionic form, ammonium (NH4+) and absorbs to the soil. The ammonium in the soil eventually disassociates or is nitrified into nitrite (NO2-) or nitrate (NO3-) by nitrifying bacteria, releasing H+ ions into the soil. If not taken up by

biomass and converted to methane, the surplus H+ ions eventually lead to the formation of an acidic soil environment. The nitrogen left over in the soil will either be taken up by plants, stored in the soil, returned to the atmosphere, or will be removed from the soil in runoff or leaching.

Fertilization of Vegetation

Fertilization of vegetation by ammonia occurs in much the same way as applying fertilizer to the soil; however, in this case ammonia gas from the air deposits on the leaf or

soil surface at the base of the plant and is taken up by the plant. Changes in plant growth can then occur, similar to those resulting from fertilization. In a grass plains environment, changes may be subtle; however, in natural or mountain areas, changes in plant species may be more obvious, promoting weedy plants while choking out native plants and wild flowers or promoting grasses and sages.

Changes in Ecosystems

An ecosystem is a natural system consisting of plants, animal, and other microorganisms

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Impacts of ....

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balance of a system and is disrupted, fragile plant and animal species can be replaced by non-native or N-responsive species. The disruption of an ecosystem can cause it to adapt by changing (positive or negative outcome), or a disruption may lead to the extinction of the ecosystem.

Smog and Decreased Visibility

When ammonia combines with NOx and SOx emissions from industrial and vehicle combustion processes it forms fine

particulates. These fine particulates (also known as PM) are a contributor to haze/smog in cites and decreased visibility (haze) in pristine areas. Smog is also a human health issue leading to an increased rate of respiratory and heart diseases.

The particulate form of ammonia has broader implications for the general public, where as the gaseous form is a localized concern for the health of animals and agricultural workers.

When in fine particulate (PM) form, ammonium particles pose a risk to human health. Such small diameter particles are able to be respired and travel deep into lung tissue to the alveoli causing a variety of respiratory ailments such as bronchitis, asthma, coughing, and farmers lung. The particulate form of ammonia (PM) is usually found in urban or suburban areas where ammonia gas from agriculture (and other sources) has undergone chemical reaction with urban emissions such as NOx and SOx and formed PM leading to smog formation.

Ammonia gas is a highly hydrophilic base that has irritant properties when inhaled which, when combined with water, can injure and burn the respiratory tract. The base form of ammonia, ammonium hydroxide, dissolves in the water of mucus membranes, hydrolyzes, and rapidly irritates tissues due to the high pH. Ammonia can also alter the uptake of oxygen by hemoglobin due to the increase of pH within the blood, which leads to decreased oxygenation of tissues, and decreased metabolic function.

Due to the side effects of ammonia gas exposure over 25 ppm, the American Conference of Governmental Industrial Hygienists (ACGIH) has recommended an 8 hour maximum exposure limit of 25 ppm to protect against the chronic effects of ammonia exposure. A 15 min short-term exposure limit of 35 ppm has been established by ACGIH and also adopted by OSHA to reduce irritant effects of ammonia exposure (i.e. eye and upper respiratory tract irritation). However, due to possible cumulative health effects over time, the recommended daily long-term occupational exposure limit of ammonia for agricultural workers is 7 ppm, and 300 parts per billion (ppb) for community exposure (community exposure must be stricter because communities contain very susceptible people such as the elderly and children). At moderate concentrations (50 to 150 ppm), ammonia exposure can lead to eye, throat and skin irritation as well as cough and mucus buildup. Prolonged exposure at this level can result in the transfusion of ammonia from the alveoli into the bloodstream and a subsequent disruption of oxygen uptake by hemoglobin. At high concentrations (>150 ppm) ammonia can scar lung tissue, cause lower lung inflammation and pulmonary edema. Exposure to high concentrations of ammonia (500 to 5000 ppm) will cause death in a relatively short time period from prevention of oxygen uptake by hemoglobin. These levels are rarely found near livestock operations, but may occur in closed manure storage facilities and poorly ventilated buildings where ammonia concentrations can accumulate ■

COMPUTER VISION SYNDROME

Computer vision syndrome (CVS) is a condition resulting from focusing the eyes on a computer or other display device for protracted, uninterrupted periods of time. Somesymptoms of CVS include headaches, blurred vision, neck pain, redness in the eyes, fatigue, eye strain, dry eyes, irritated eyes, double vision, vertigo/dizziness, polyopia (multiple vision), and difficulty refocusing the eyes. These symptoms can be further aggravated by improper lighting conditions (i.e. glare or bright overhead lighting) or air moving past the eyes (e.g. overhead vents, direct air from a fan).

Prevalence: According to the National Institute of Occupational Safety and Health, computer vision syndrome affects about 90% of the people who spend three hours or more a day at a computer. Another study in Malaysia was conducted on 795 college students aged between 18 and 25. The students experienced headaches along with eyestrain, with 89.9% of the students surveyed feeling any type of symptom of CVS.

Therapy: Dry eye is a major symptom that is targeted in the therapy of CVS. The use of over-the-counter artificial-tear solutions can reduce the effects of dry eye in CVS.

Asthenopic (eye strain) symptoms in the eye are responsible for much of the severity in CVS. Proper rest to the eye and its muscles is recommended to relieve the associated eye strain. Various catch-phrases have been used to spread awareness about giving rest to the eyes while working on computers. A routinely recommended approach is to consciously blink the eyes every now and then (this helps replenish the tear film) and to look out the window to a distant object or to the sky-doing so provides rest to the ciliary muscles. One of the catch phrases is the "20 20 20 rule": every 20 mins, focus the eyes on an object 20 feet (6 meters) away for 20 seconds. This basically gives a convenient distance and timeframe for a person to follow the advice from the optometrist and ophthalmologist. Otherwise, the patient is advised to close his/her eyes (which has a similar effect) for 20 seconds, at least every half-hour.

Decreased focusing capability is mitigated by wearing a small plus-powered (+1.00 to +1.50) over-the-counter pair of eyeglasses. Wearing these eyeglasses helps such patients regain their ability to focus on near objects. People who are engaged in other occupations-such as tailors engaged in embroidery-can experience similar symptoms and can be helped by these glasses. A Pacific University research study of 36 participants found significant differences in irritation or burning of the eyes, tearing, or watery eyes, dry eyes, and tired eyes, that were each improved by filtering lens.

Eye strain: Eye strain also known as asthenopia is an eye condition that manifests itself through nonspecific symptoms such as fatigue, pain in or around the eyes, blurred vision, headache and occasional double vision. Symptoms often occur after reading, computer work, or other close activities that involve tedious visual tasks.

When concentrating on a visually intense task, such as continuously focusing on a book or computer monitor, the ciliary muscle tightens. This can cause the eyes to get irritated and uncomfortable. Giving the eyes a chance to focus on a distant object at least once an hour usually alleviates the problem.

A CRT (Cathod Ray Tube) computer monitor with a low refresh rate (<70Hz) or a CRT television can cause similar problems because the image has a visible flicker. Aging CRTs also often go slightly out of focus, and this can cause eye strain. LCDs do not go out of focus but are also susceptible to flicker if the backlight for the LCD uses PWM (Pulse Width Modulation) for dimming. This causes the backlight to turn on and off for shorter intervals as the display becomes dimmer, creating noticeable flickering which causes eye fatigue.

A page or photograph with the same image twice slightly displaced (from a printing mishap, or a camera moving during the shot as in this image) can cause eye strain by the brain misinterpreting the image fault as diplopia and trying in vain to adjust the sideways movements of the two eyeballs to fuse the two images into one. .

Causes: Sometimes, asthenopia can be due to specific visual problems, for example, uncorrected refraction errors or binocular vision problems such as accommodative insufficiency or heterophoria (deviation of eyes from parallelism). It is often caused by the viewing of monitors such as those of computers or phones.

Treatment: While preventive measures, such as taking breaks from activities that cause eye strain are suggested, there are certain treatments which a person suffering from the condition can take to ease the pain or discomfort that the affliction causes. Perhaps the most effective of these is to remove all light sources from a room, and allow the eyes to relax in darkness. Free of needing to focus, the eyes will naturally relax over time, and relieve the discomfort that comes with the strain. Cool compresses also help to some degree, though care should be taken to not use anything cold enough to damage the eyes themselves (such as ice). A number of companies have released "computer glasses" which, through the use of specially tinted lenses, help alleviate many of the factors which cause eye strain, though they do not completely prevent it. Rather, they just make it harder to strain the eye. ■

TANK TRUCK STATIC GROUNDING PROTECTION

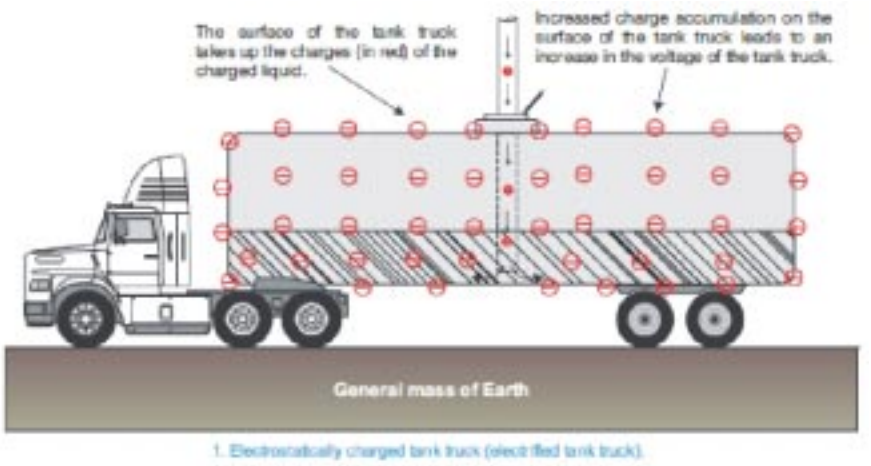
As the product (liquid or powder) moves through the transfer system and interacts with pumps, valve, filters meshes and pipe walls, the product will be building up the amount of electrostatic charge it carries. In electrical terms this is commonly described as static charge accumulation. When the product is transferred into the tank truck, the tank truck, will in turn, become electrified and be subjected to a rising voltage.

For example, a typical tank truck when it is being filled with a liquid at recommended flow rates, but is without static grounding protection, could have its voltage raised to between 10,000 volts and 30,000 volts within 15 to 50 seconds. This voltage range is very capable of discharging a high energy electrostatic spark towards objects at a lower voltage potential, especially anything at ground potential. Examples of objects at ground potential could be operators working in the vicinity of the truck, or the filling pipe situated in the hatch on top of the tank truck.

It is possible to estimate the energy of such sparks by combining the capacitance of the tank truck with the voltage carried by the tank truck.

The capacitance is a measure of how much charge can accumulate on the outer surface of the tank truck. Because tank trucks have a very large surface area, they can accumulate very large amounts of charge, which in turn, creates the presence of very high voltages on the surface of the tank truck.

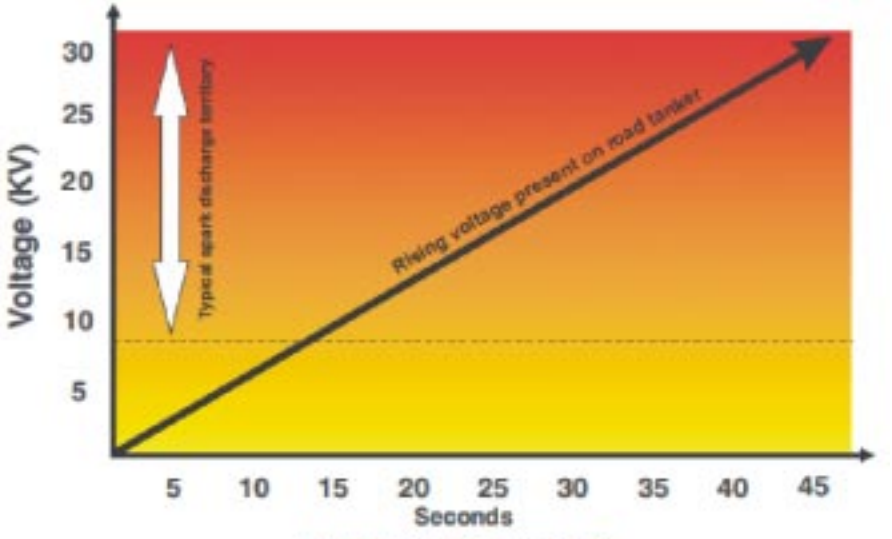
For example, a truck with a capacitance of 1000 pico-farads that is electrified to 30,000 volts has approximately 450 milli-joules of potential spark energy. Given that most hydrocarbon vapors and gases have MIEs (Minimum Ignition Energy) of less than 1 milli-joule and most combustible dusts have MIEs of less than 200 millijoules, it's easy to see why tank trucks that do not have static grounding protection in place can be a major ignition source in a hazardous area.



1. Electrostatically charged tank truck (electrified tank truck).

To counteract this risk, it is important to ensure that the tank truck does not have the capacity to accumulate static electricity. The most practical and comprehensive way of achieving this is to make sure that the tank truck is at ground potential, especially before the transfer process starts. When we describe "ground potential" we mean that the tank truck is connected to the general mass of the Earth, which is commonly referred to, in electrical terms, as "True Earth".

This is because the general mass of the Earth has an infinite capacity to pull static charges from the tank truck, which in turn eliminates the generation and presence of voltages on the tank truck. The Earth-Rite® RTR (Road Tide Row) performs three critical functions which ensure the fire and explosion risk of an ignition caused by static electricity is eliminated.



2. Voltage build-up on charged tank truck.

The first function the RTR performs is in determining if the driver or operator has made a secure

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Tank Truck ....

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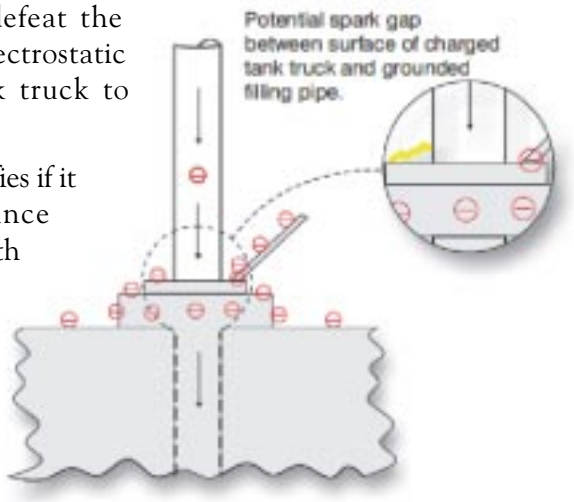
connection to the body of the tank truck. This minimises the risk of the driver obtaining a permissive condition for the static grounding system by connecting to objects like the loading rack, or objects on the tank truck that could be isolated from the main body of the tank truck, as this would defeat the objective of passing electrostatic charges from the tank truck to ground.

The RTR then verifies if it has a low resistance connection to True Earth via the structure to which it is connected, e.g. the loading rack.

As any static charges generated by tank truck loading (unloading) process will travel to ground via the RTR, it is important to ensure the RTR itself has a low resistance connection to True earth.

When both of these conditions are positive, i.e.:

1. The RTR knows it is connected to a tank truck.
2. The RTR knows it is connected to a verified earth ground. the RTR will then establish if the connection resistance between the tank truck and the verified earth ground is 10 ohms or less.



3. Example of potential spark gap during tank truck loading operation.

10 ohms is the benchmark requirement repeated in several international standards

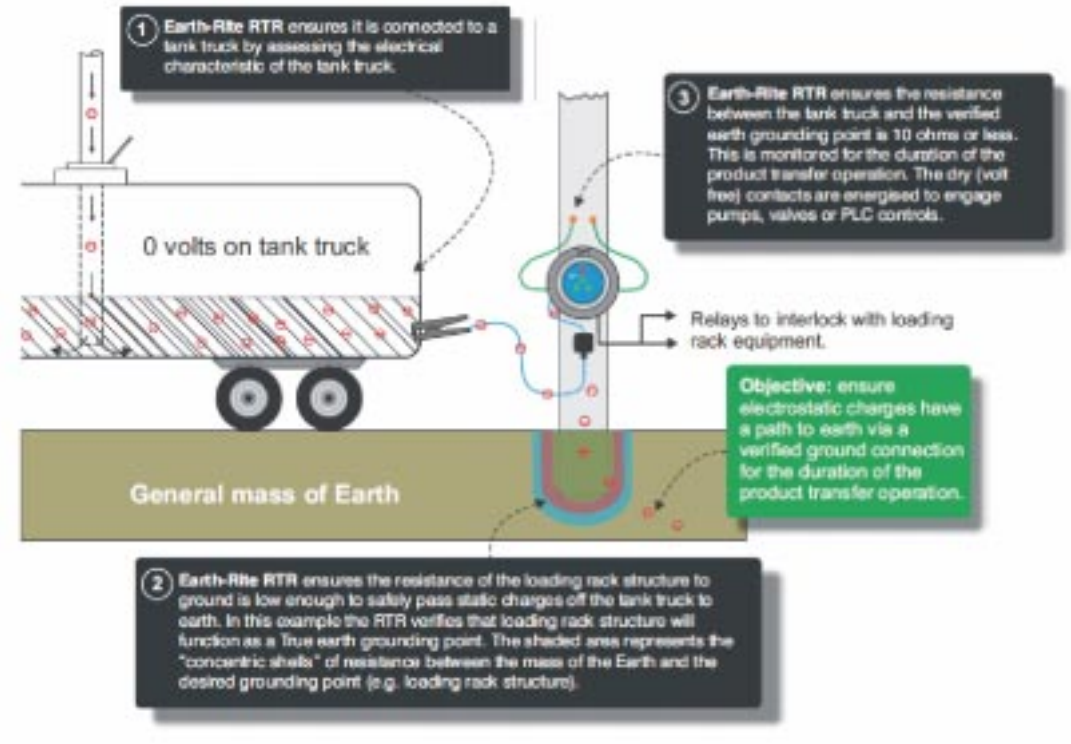
If the resistance is not more than 10 ohms the RTR will indicate that the tank truck is connected to ground and indicate this via its ground status indicators, a cluster of green LEDs that pulse continuously.

The reason the LEDs pulse is to indicate that the RTR is continuously monitoring the static grounding circuit between the tank truck and the verified earth grounding point (e.g. loading rack) for the duration of the loading (unloading) process. If the resistance of the tank truck's connection to the verified earth ground ever rises above 10 ohms, the RTR will go non-permissive.

Both of the standards listed above recommend that interlocks controlling the flow of product to or from the tank truck are provided by the static grounding system. To comply with this requirement, the RTR has two volt free contacts that can interface with control circuits for pumps, valves and PLCs.

If the RTR determines that the tank truck has lost its connection to ground, the volt free contacts can be used to halt the transfer process. The benefit of halting the transfer process removes the charging mechanism that would otherwise charge up the tank truck while it has no active static grounding protection in place.

* *"earthing": the equivalent term is "grounding".* ■



4. How the Earth-Rite RTR ensures static electricity cannot build-up on the tank truck.

CASE STUDY

CASE STUDY 1:

FIRE DUE TO SIGHT GLASS LEAK:

Description of Incident

A leak originating from a cracked level sight glass led to a fire at a flash tower of an oil refinery. The fire damaged part of the side of the flash tower and melted the insulation material on some of the pipe fittings. No worker was injured in this incident.

Possible Causes and Contributing Factors

Machine

- The oil leaked from the level sight glass as it had cracked due to thermal fatigue. The sight glass was subjected to severe temperature fluctuations each time the plant was shut down and re-started.

Medium

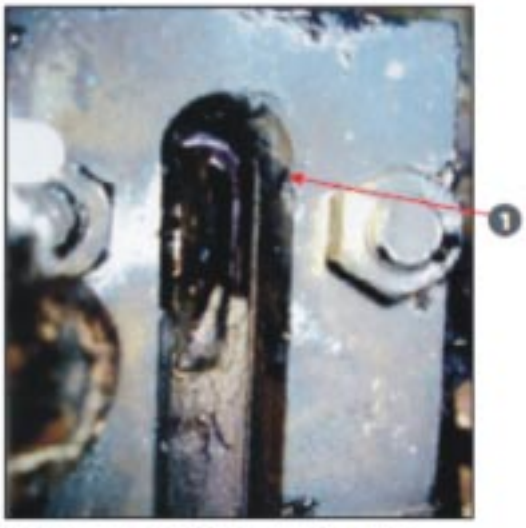
- The temperature of the oil leaking from the flash tower was above its auto-ignition temperature.

Management

- The sight glass was neither regularly inspected nor maintained.

Recommendations and Learning Points

- Glass components are susceptible to damages once installed. Therefore, an appropriate material that is able to handle operational conditions such as fluctuating temperature and pressure must be selected at the design stage.
- Implement a risk-based inspection and maintenance programme for all fixtures that are part of the process including sight glasses.
- Set up a replacement programme for all sight glasses based on manufacturer recommendations, and/or after going through a fixed number of operational cycles.
- Where feasible, put in place engineering measures (e.g., excess flow check valve) in the sight glass assembly to prevent leakage of vessel contents through the sight glass in the event of glass breakage.
- Explore deploying longer cycles of ramped heating and ramped cooling to avoid extreme temperature fluctuations. It is important to know that while glass is generally able to withstand high temperatures, it may be weakened when it is prone to severe temperature fluctuations.
- Establish an emergency response plan, and carry out periodic drills and exercises for employees to practice preliminary fire control, leak containment, evacuation, rescue and first aid.



Close-up view of the cracked level sight glass.

1. Location of oil leak.

Causal Analysis	
Evaluation of loss	• Property damage
Type of contact	• Fire
Immediate cause(s)	• Oil leak from cracked level sight glass
Basic cause(s)	• Sight glass cracked due to thermal fatigue
	• No regular inspection and maintenance for the sight glass
Failure of OSHMS	• Mechanical integrity and reliability

CASE STUDY 2:

CONTACT WITH HYDROFLUORIC ACID DURING DECOMMISSIONING OF PRESSURISED TANK

Description of Incident

Liquefied propane with traces of hydrofluoric (HF) acid was passed through a pressurised tank for treatment. The tank contained solid potassium hydroxide which is being consumed during the treatment had to be periodically replaced. A process technician was isolating the tank to replace the potassium hydroxide. After depressurising the tank, he connected a rubber hose from the

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Case Study ....

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nitrogen gas supply valve to the utility connector valve of the tank to initiate nitrogen purging. He then opened the utility connector valve without verifying that the tank had been fully depressurised. The rubber hose burst and contents from the tank gushed out. The technician suffered chemical burns and later succumbed to his injuries.

Possible Causes and Contributing Factors

Man

- The worker opened the valve located at the bottom of the tank to depressurise the tank. However, this method caused the sludge to choke the pipeline and hinder the depressurising process.
- The worker failed to ensure complete depressurisation of the tank before opening the bottom valve.
- The worker wore a lower-class HF suit which did not provide sufficient protection for the task in the event of a chemical splash.
- He proceeded to purge the tank without authorisation from his supervisor.

Management

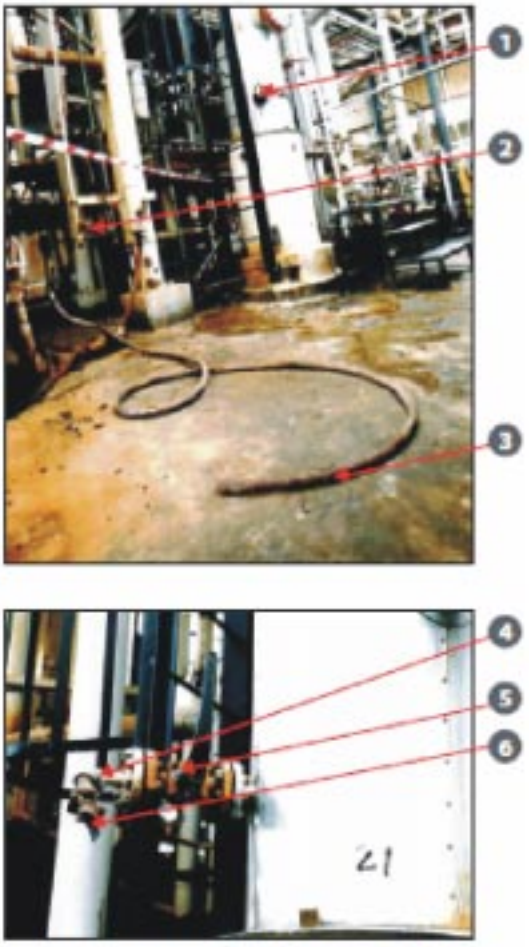
- Safe work procedures have not been documented specifically for tank decommissioning.
- The management failed to ensure that the workers wore the appropriate class of chemical protective suit.

Causal Analysis

Evaluation of loss	• One fatality
Type of contact	• Contact with corrosive substance, HF acid
Immediate cause(s)	• Rubber hose became defective due to incomplete depressurisation of the tank
Basic cause(s)	• Did not adhere to work instructions
Failure of OSHMS	• Operating procedures and safe work practices

Recommendations and Learning Points

- Install a non-return valve on the tank utility connector line to prevent backflow of tank contents.
- Ensure that flexible hoses are compatible with the contents being conveyed, and the system temperature and pressure.
- Check all flexible hoses and their couplings regularly for leaks, and ensure that they are periodically checked and replaced when required.
- Ensure that the tank is completely depressurised by using appropriate instruments (e.g., pressure indicators and alarm/interlock system) before starting work.
- Ensure that the importance of checking the tank pressure prior to connecting hoses for nitrogen purging operation is clearly indicated in the safe work procedures.
- Supervise the workers on-site to make sure they comply with safe work practices.
- Replace flexible hoses with fixed piping where possible.
- Conduct periodic risk assessment reviews for high risk activities. ■



Photographs showing the burst rubber hose used to connect the tank utility connector valve to the nitrogen gas supply valve.

1. Utility connector valve.
2. Nitrogen gas supply valve.
3. Rubber hose.
4. Utility connector.
5. Utility connection valve.
6. Burst rubber hose with its quick coupling.

IN THE NEWS

Will climate action deliver decent work?

A promise of more and better jobs: A transition to low-emission, environmentally sustainable economies and societies will be beneficial to job creation. An ILO review of nearly 20 studies examining the potential impacts of reducing carbon-emissions and improving energy and resource efficiency, finds net gains to the order of 15 million to 60 million additional jobs by 2030.

Doubling the share of renewable energy by 2030 could create up to 24 million new jobs in the sector on top of the 8 million jobs it already counts, according to the International Renewable Energy Agency. But, job gains are not confined to the energy sector. The high labour intensity of sustainable farming methods has also been demonstrated to yield significant employment gains in a range of developing countries.

Amid complex changes in the world of work: But changes across markets are much more complex. The goal of decarbonisation by the end of this century - which is necessary to keep the average global temperature from rising more than two degrees Celsius above its average during pre-industrial times - has massive implications for economic growth and employment. A decisive move towards a low-carbon economy is likely to cause shifts in the volume, composition and quality of employment across sectors and affect the level and distribution of income.

Four types of changes can be expected:

1. Some jobs will be created.
2. Some jobs will be lost.
3. Other jobs will be replaced.
4. Many more jobs will be transformed.

While the potential for job creation outweighs the risks of job losses, certain economic sectors will undergo more drastic and potentially painful readjustments.

Energy is a case in point. The bulk of the world's energy systems still rely on fossil fuels, notably oil and coal. Studies have suggested that to date, adverse employment changes in fossil fuels have been the result of industry restructuring and consolidation, as well as rising mechanisation, and less as a consequence of responses to climate change.

However, as the outlook for renewable energies improves, significant policy shifts are starting to take shape. The Chinese government announced a plan to close thousands of coal mines in order to reduce overcapacity and address climate change. This policy will lead to the loss of an estimated 1.3 million jobs in the coal sector and another 500,000 jobs in the steel industry, accounting for about 20 per cent and 11 per cent of China's total workforce in these two sectors.

The imperative of a just transition for all: As countries prepare to implement their climate change commitments, they find themselves in a global situation of massive unemployment. Estimates from the ILO suggest that some 600 million new jobs need to be created by 2030 to reach Sustainable Development Goal 8 on Economic Growth and Decent Jobs. This priority cannot be set aside and disconnected from climate change objectives.

The Paris Agreement acknowledges the need to respond to this issue, noting that "the imperatives of a just transition of the workforce and the creation of decent work and quality jobs in accordance with nationally defined development priorities". Concretely, this means that responses to climate change should maximize opportunities for decent work creation and ensure social protection for all.

As the Agreement enters into force, a key question is how to give practical meaning to the notions of decent work and a just transition to sustainable economies. Climate change negotiators are considering this challenge as part of a discussion known as the "improved forum on response measures", which examines the effects that climate-change policies could have on issues like employment.

Further to this point, the governments, workers' and employers' organizations which comprise the ILO, recently adopted a set of Guidelines for a just transition towards environmentally sustainable economies and societies for all. These guidelines offer a comprehensive framework of policies that countries can draw on to implement their climate change commitments. For example, the guidelines suggest that energy subsidy reforms have a better chance of success if designed with social protection and compensation schemes for disproportionately affected groups, an idea in line with findings from the International Monetary Fund and other institutions.

Active engagement of governments, workers and employers

The world of work played a crucial role in the process leading up to the adoption of the Paris Agreement. It will be indispensable to its successful implementation.

Enterprises will have to continue spearheading the innovation of green products and services, improving their business processes and scaling-up investments that will unleash climate-resilient growth through greater efficiency.

A capable workforce with adapted skills is necessary to transform our energy systems, buildings, industry, transportation and agriculture. A key challenge before us is to improve educational and training systems to deliver the required skills needed to reach the goals of the Paris Agreement.

Importantly, social dialogue allowing governments, employers and workers' organizations to engage collectively with climate--change policies, can facilitate their implementation with benefits for workers, businesses of all sizes, and society at large.