A Quarterly Loss Prevention Digest

Eighth Edition

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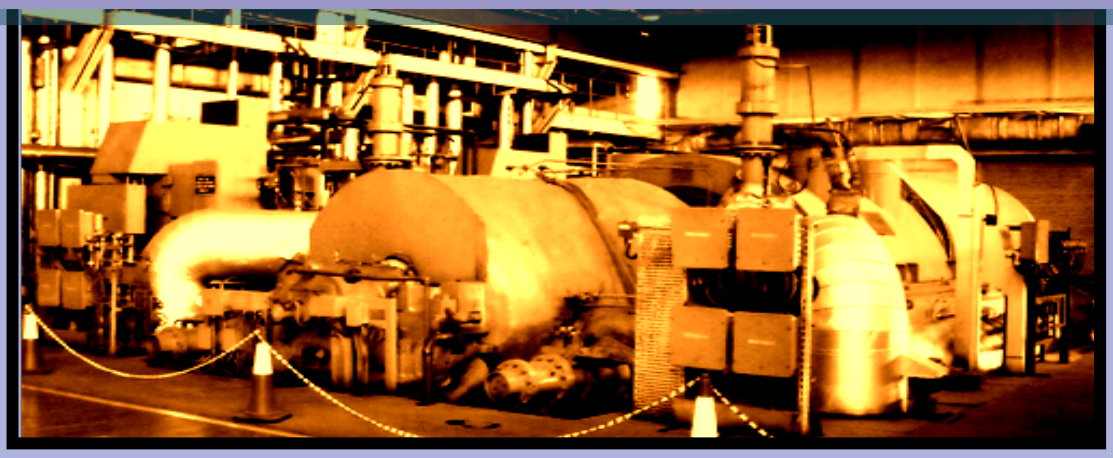
IN-SIGHT

Lead Article:

Loss Prevention in Thermal Power Plants



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redefining / general insurance

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Dr. Amarnath Ananthanarayanan

CEO & MD

Bharti AXA General Insurance Company Limited

Message from CEO and MD

It is with great pride and happiness that we would like to share with you that Bharti AXA General Insurance has entered the league of 1000 crores.

On this occasion, we are pleased to add that we are the 1st multiline general insurance company to reach 1000 crores in 4 years. We have till now besides this, with your support re-written history by capturing close to 2 million trusts, brought over 3 lakh smiles, and have won many awards and accolades at both the national and international level. Thank you for your continued support and trust in us, which strengthens our confidence and inspires us to continue to serve customers better with innovative products and enhanced service levels.

We continue to look forward towards your patronage and support with which we shall in the not so distant future, redefine industry standards to become the Preferred General Insurance Organization in India.

Subrahmanyam B.

Sr. VP & Head, Health and Commercial Lines

Bharti AXA General Insurance Company Limited

From the Editor's Desk

Government of India's ambitious plan of 'Power for all by 2012' has helped us to significantly increase our power generation capabilities. However, we still continue to suffer from acute energy shortages in a very big way due to the fact that our increase in energy supply consistently gets outstripped by our ever increasing energy demand. The country hence faces a need to further augment its power generation capacities and also answer a question on the type of energy resource it needs to select for this requirement. In the past, cost happened to be the only selection criteria for such requirements. The present trend, however, is to take a more holistic view, by considering all parameters including social, environmental and technological impacts of this selection. Coal, because of its high global warming potential and issues related to environment and climate change would under the new set of parameters get the least of the priorities in a resource selection exercise. However for a developing country like India the scenario is slightly different. Positives such as the abundant availability of coal in the country and the significantly lesser costs involved in setting up such plants makes this a preferred resource for power generation. This gets further support from the negatives associated with other choices such as - limited reserve potential of petroleum and natural gas, eco-conservation restrictions on hydro projects, and the negative perception people have regarding nuclear power. Coal thus becomes one of the most preferred choices for power generation in our country and this ads momentum to the growth story of thermal power plants. In this issue we focus on hazards and loss mitigation measures pertaining to thermal power plants in general and coal in particular. We wish all our readers a very happy and informative reading experience.

1.0. Lead Article: Loss Prevention in Thermal Power Plants

1.0 Introduction

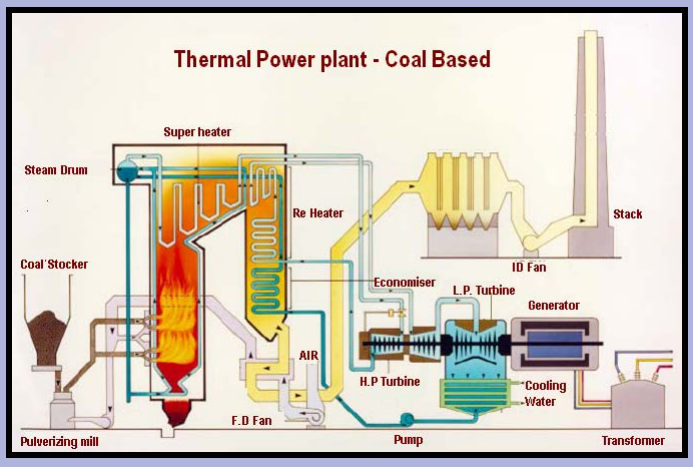
Thermal power is the largest source of electrical power in India, accounting for about 75% of total power generation. Thermal power plants are those in which the prime mover is steam driven. Steam in thermal power plants can be generated using a variety of fuels; hence we have thermal plants using coal, nuclear, geothermal, solar, solid waste, natural gas/ naphtha, and biomass as fuels. Non-nuclear thermal power plants i.e. the fossil-fuelled ones which are not co-generation plants are also referred to as conventional power plants. Amongst the fuels being used coal happens to be the most widely used fuel and hence the focus on this article is on coal fired thermal power plants. At present 54.09% or 93918.38 MW of total electricity produced in India is from Coal Based Thermal Power Stations.

2.0 General Process

2.1. Approx per day material requirements for a 1000 MW power plant is:

Material	Approx. Per day requirements
Coal	12,000 Tonnes
Furnace Oil	101 Cubic Meters
Water	9800 Cubic meters
Note: About 80MW of Electrical Power is consumed for producing 1000 MW.	

2.2 Process Details



The main process involves generation of steam in boilers (which convert the chemical energy of coal into heat energy), conversion of heat energy into electrical energy in the Turbo-Generator sets and thereafter voltage step-up and transmission from the electrical switchyard section.

In the Boiler section, fuel consisting of a mixture of pulverized coal and hot air is forced into the boilers at a high pressure where it rapidly ignites. Hence when water (of a very high purity) flows vertically up the tube-lined walls of the boiler, it turns into steam, and flows into the boiler drum, where steam gets separated from traces of water. Steam then passes through a manifold in the roof of the drum onto a pendant super heater from where it is piped to the turbo-generator section.

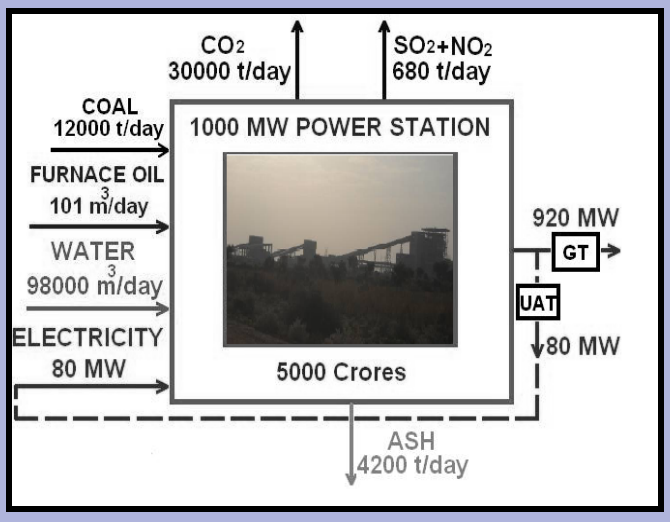
In the turbo-generator section, steam at very high-pressure first enters the high pressure stage of a three-stage turbine. Exhaust from this stage which is reduced both in pressure and temperature, is then taken back to the boiler re-

heater for re-heating. Reheated steam is then sent to the intermediate stage of the turbine from where it directly flows on to the low pressure stage. In the turbine heat energy of steam gets converted into mechanical energy (kinetic energy) resulting in the rotation of the turbine rotor and shaft.

The turbine shaft is coupled to the electrical generator, and at the generators kinetic energy gets converted into electrical energy. The voltage at which generation takes place is not very high and hence needs to be stepped up before transmission to avoid transmission losses.

In the transmission section, voltage gets stepped up through transformers and electrical energy at this stepped up voltage is evacuated through transmission lines.

2.3. Typical consumption and emission pattern of a 1000 MW thermal plant is as illustrated below:



3.0. Fire Hazards

Thermal power plants fall under ordinary hazard occupancies as listed in Tariff Advisory Committees (TAC) Fire Protection Manual. Fire hazards in coal based thermal power plants arise on account of factors such as use of high power electrical equipment, extensive cabling (around 300 KMs), fuels used in boilers, and use of lubricating oils in large quantities (10,000 - 30,000 litres). Details from a presentation on 'Fire loss scenario in Power Plants in India' made at a LPA (Loss Prevention Association of India) seminar in February 2005 reveal the following facts on the analysis of the 27 major fires (loss more than 50 lakhs) that took place over a period of 15 years (between 1988 and 2003) in various power plants in India.

In terms of frequency

Area/Equipment	Frequency %
Transformer/Switch yard	30%
Coal Handling/Coal Conveyor	22%
Turbo-Generator	15%
Boiler	7%
Lube oil system	7%
Turbine	3%
Others	16%

In terms of severity (as a % of all losses that occurred during this period)

Area/Equipment	Quantum of loss %
Turbo-generators	63%
Transformers	23%
Others	14%

3.1. Fire Hazards in Transformers and switch yards

Fire hazards in transformers and switchyards arise due to the combustible nature of insulating oils used in these equipments. Sudden heating of transformer oil due to incipient or external faults can cause a pressure build up inside the transformer tank resulting in the failure of bushings. The heated oil coming out through the bushing area will ignite on coming into contact with oxygen present in the air as the insulating oil will be heated above its auto ignition point.

Some of the causes for transformer fires are:

- Degradation of insulating oil due to ingress of moisture
- Failure of insulation at transformer windings
- External faults not getting cleared within safe time limits
- Manufacturing defects in transformers
- Internal arcing & Lightning

Risk control measures that mitigate this hazard:

- Condition monitoring of major transformers and its operating parameters including oil and winding temperatures and oil level on an hourly basis.
- In addition to periodic testing of transformer oil Dissolved Gas Analysis should be carried out on an annual basis
- Testing of transformer earthing systems and insulation winding of transformers

3.2 Fire Hazards in Coal Handling sections/Coal Conveyors

Coal storage yards, Coal conveyor belts and Coal crushers in thermal power plants have high exposure to fire because of the combustible nature of this material (coal) and because of the type of operations that are carried out on it. Spontaneous combustion of coal is found to be a major cause for fires in coal storages. While fires in coal conveyor belts are caused mainly on account of frictional heating, in coal crushers the hazard lies in the pulverization of coal which can lead to the formation of combustible coal dusts that can explode or easily get ignited.

Reduction of fire hazard in coal storages is possible through.

- Following the "first in, first out" policy for storage and usage of coal
- Avoiding stocking of wet coal with dry coal as this can cause spontaneous combustion
- Strict implementation of ‘Hot work’ and ‘Smoking Restrictions’ in coal storage areas
- Use of dust proof type electrical fittings in coal storage and coal handling areas

Recommendations that help minimize fires in coal conveyors are:

- Use of fire resistant material for conveyor belts which should be in conformance with IS 3181; 1992 - Fire resistant conveyor belting for underground mines and such other hazardous applications

- Regular cleaning of coal spillages over enclosed conveyor systems
- Following a rigid maintenance schedule for motors, conveyors, etc
- Since roller bearing failures are a major cause for fires in this area additional attention needs to be paid regarding maintenance of these

Fire hazards in coal crushers can be minimized by

- Using dust proof electrical light fittings that conform to IS 4013: 1967 (Specifications for dust tight electrical light fittings)
- No temporary/loose wiring to permitted in this area, hence all wiring carried out over here should be of a permanent nature
- Monitoring the presence of carbon monoxide helps in improving fire safety in this area

3.3 Fire hazard in Turbo Generators

Fire hazards in turbo-generator area arise due to the use of lubricating oils and Hydrogen gas for lubrication/cooling purposes. Lubricating oil which has an auto ignition temperature of around 200°C is circulated at a very high pressure for lubricating the turbo-alternator bearings. This can cause oil leakages occurring at pipe flanges to come out in the form of a very fine spray. Such sprays can easily get ignited on coming into contact with hot surfaces such as the un-lagged portions of steam pipes which are at temperatures well above the auto ignition temperature of lubricating oils. This can also occur at turbine high pressure end due to seal failures that can take place due to severe vibrations.

Hydrogen has a wide flammability range (4- 74% in air by volume); and the energy required to ignite this gas is also very low (0.02mJ). These properties bring in a fire and explosion hazard to the turbo-alternator area when this gas is used for generator cooling. Leakages of this gas can accumulate in structures surrounding the generator and can subsequently explode on contact with an ignition source.

Risk minimization measures for hazard control:

- Use of fire resistant hydraulic fluids having auto ignition temperature of around 550°C as lubricating oils
- Hydrogen cylinders being stored outside the turbo-generator building or if located within being stored in a separate well ventilated room that has exhaust facilities
- In case the plant makes use of a centralized storage facility for hydrogen gas then an emergency shut off valve which can be operated from the control room should be installed in the supply line at an accessible location
- Periodic check for hydrogen gas leakages to be carried out at the generator and the sealing system using fixed or portable leak detectors

3.4 Fire hazard in Boilers

Main causes for fires in boiler areas are pulverized coal or oil leakages occurring around burner fronts and leakages from fuel oil lines coming into contact with hot boiler face surfaces. In addition explosions can also occur at ESP's (Electro Static Precipitators) due to the presence of Carbon Monoxide.

To minimize fire hazard in boiler areas

- Preventive and predictive maintenance practices including servicing of oil guns with periodic replacement of copper gaskets to be carried out at scheduled intervals
- Combustion controls, water level alarm and back up should be checked and properly maintained
- Physical supervision of boiler area by plant personnel during and the period immediately following oil burner light up operations is to be ensured
- Monitoring the concentration of Carbon Monoxide (CO) gas in ESPs, regular inspection of explosion venting devices and periodic maintenance of instruments measuring explosive gas concentrations is to be carried out
- Housekeeping in boiler areas should ensure that spillage of combustible material like pulverized coal or fuel oil are not allowed to accumulate on boiler structural's, equipment or electric cables

3.5 Fire Hazard in Cables/Cable galleries

Fire in cables/cable galleries can occur due to electrical faults or external ignition sources such as hot work. Major concerns during cable fires are that fire spread occurs rapidly and fire fighting is rendered difficult due to generation of toxic gases, smoke abundance and cable galleries being enclosed areas with access restrictions.

Risk mitigation measures for cable fires are:

- Use of Fire Retardant cables
- Ensure all cables are well laid on cable trays and that there are no loose or hanging cables or those which have too many cable joints
- Sectionalize cable galleries of individual units into separate fire compartments as this ensures that fire in one of the units will not spread to other units and result in a complete shutdown of the entire power plant

4.0. Fire Detection and Protection

4.1. Fire Detection

Areas in a thermal power plant where fire detection system needs to be provided and the recommended types are given in the table below.

Area	Recommended detection system
Cable galleries	Linear Heat Sensors are more preferable than smoke detectors
Coal conveyor belts	Infra red / flame detectors
Oil Burner fronts of boilers, Process control rooms, stores building, administrative offices, and IT/ Server rooms	Smoke and heat detectors

4.2. Fire Protection

Fire protection measures can be categorized into:

- Passive Fire Protection Systems, and
- Active Fire Protection Systems.

4.2.1. Passive Fire Protection

Passive fire protection systems help in the prevention of fire spread, thereby reduce losses that can occur due to fire. These strategies are very critical in a power plant and measures in this regard should include:

- **Baffle walls:** Baffle walls need to be provided between transformers where adequate spatial segregation commensurate with the quantity of oil in the equipment is not available.

- **Sealing of cable pass openings:** Openings around cable entries in walls and floors of buildings/substations should be properly bricked up, plastered and sealed with intumescent material to prevent the spread of fire through cables from one area to another.

- **Fire retardant coatings on cables:** Coating of cables with fire retardant paints for a length of at least 1 meter on either side of its entry and exit at floor and wall crossings of /at substation and buildings help in further retarding fire spread through cables. In addition, cables that pass through fire prone / hot areas (like boilers) and cables of fire pumps when laid in the same cable trench along with other cables should also be coated with fire retardant paints to improve fire safety

4.2.2. Active Fire Protection

Active fire protection devices help in fighting and putting out a fire. Towards this, various manual and automatic systems are employed. These include hydrants, sprinklers, water spray systems and gas based systems. For a thermal plant, a well laid out hydrant system in line with TAC (Tariff Advisory Committee) regulations should form the basic fixed fire protection system covering the entire plant including fire vulnerable areas such as coal storages, main stores (where machinery spares and consumables are stored), and storage areas for flammable liquids such as diesel and furnace oil. In addition, automatic fixed

fire protection systems need to be provided in areas that are mentioned below:

- Automatic gas discharge Systems (CO_2 Protection System): Process control rooms
- High Velocity Water Spray Systems: For generator and step-up transformers; and oil burner fronts of boilers.
- Medium Velocity Water Spray System: Coal carrying circuits (conveyor belts) and cable galleries
- Automatic Sprinkler Systems: Main stores building and administrative offices

5.0. Occupational Health and Safety

The following health and safety hazards are of particular concern in thermal power plants because of their potential to cause injury to those exposed to these.

- Non-ionizing radiation
- Heat
- Noise
- Electricity
- Hazardous chemicals being used
- Dust

5.1 Non-ionizing radiation

Thermal power station facility workers may have a high exposure to electric and magnetic fields since they are working in close proximity to high voltage equipment such as generators, transformers, switchgear, and transmission lines. Safe occupational exposure levels have been developed by international organizations such as the International commission on Non- Ionizing Radiation Protection (ICNIRP), and the Institute of Electrical and Electronics Engineers (IEEE) and could be used as a reference in dealing with this hazard.

Exposure to radiation hazard can be minimized by

- Identification of potential exposure levels in the workplace and the use of personal monitors during work activities
- Training of workers in the identification of occupational EMF levels and the hazards associated with these
- Having action plans that reduce occupational exposure by limiting exposure time through work rotation, increasing distance between the source and the worker, and where feasible the usage of shielding material

5.2 Heat

Exposure to heat becomes an occupational hazard for persons associated with operation and maintenance of Boiler units, pipes, and related hot equipment.

Control measures that can mitigate hazards arising from heat exposure are:

- Provision of adequate ventilation and sufficient drinking water facility in boiler areas

- ❑ Reducing exposure time of employees working in elevated temperature environments
- ❑ Use of warning signs along with shielding of surfaces where workers come in close contact with hot equipment, including generating equipment, pipes etc.

5.3 Noise

The noise sources in the thermal power stations are numerous like – turbo-generators and auxiliaries; boilers and auxiliaries including coal pulverisers; diesel engines; pumps; compressors; condensers; precipitators and cooling towers. According to world health organization exposure to noise in industries must be limited to 75 dB (A).

Measures that would help reduce exposure to noise are:

- ❑ Insulating control rooms to reduce noise levels to below 60dB
- ❑ Use of Personal Protective Equipment such as ear muffs/ ear plugs as appropriate at all times when exposure to noise exceeds 75dB

5.4 Electrical Hazards

Energized equipment and power lines can pose electrical hazards for workers at thermal power plants.

Recommendations to minimise this risk:

- ❑ Strict implementation of 'LOTO' (electrical Lock Out and Tag Out) system before undertaking of work on electrical equipment
- ❑ Safe work practices before starting of repair work on equipment which ensures checking of voltages after de-energization to ensure that there is no electric supply to the equipment
- ❑ De-energization and proper grounding of live power equipment in outdoor yards before starting of work. It is also advisable to condor of bays where work is being carried out
- ❑ Electrical safety training for all workers working with or around exposed components of electric circuits. Training should include, but not be limited to, training in basic electrical theory, proper safe work procedures, hazard awareness and identification, proper use of PPE, proper lockout/tag out procedures, first aid including CPR, and proper rescue procedures. Provisions should also be made for periodic retraining as necessary

5.5 Dust

Dust is generated in handing solid fuels, additives, and solid wastes (e.g., ash). Dusts in thermal power plants may contain silica which causes silicosis, arsenic which causes skin and lung cancer, coal dust which causes black lung and other potentially harmful substances.

Control measures for control of dust are:

- Use of suitable local exhaust ventilation at dust generation points to keep dust below applicable guidelines
- Regular inspection and maintenance of asbestos containing materials (e.g., insulation in older plants which may contain asbestos) to prevent airborne asbestos particles
- Use of personal protective equipment such as dust respirators by persons working in dust prone areas

5.6 Chemical Hazards

Thermal power plants utilize hazardous materials, including ammonia for NOX control systems, and chlorine gas for treatment of cooling tower and boiler water.

The Legal airborne Permissible Exposure Limit (PEL) of Ammonia as per OSHA (Occupational Society for Health and Administration, USA) guidelines is 50 ppm averaged to an 8 hour work shift. Ammonia poses health threats like Asthma, Pulmonary edema (Formation of liquid in Lungs) and Frostbite and is to be safely stored and handled.

As regards chlorine the permissible exposure limit as per OSHA standards is 1 ppm (3 milligrams per cubic meter). A worker's exposure to chlorine should at no time exceed this ceiling level. Chronic exposure to low levels of chlorine gas can also result in a dermatitis known as chloracne, tooth enamel corrosion, coughing, severe chest pain, sore throat, and increased susceptibility to tuberculosis

To minimize exposure to these hazards

- Recommend usage of aqueous ammonia in place of pure liquefied ammonia as this will reduce exposure levels
- Use of sodium hypochlorite in place of gaseous chlorine for water treatment

Our ten loss prevention commandments for thermal power plants are given in the page that follows

N Sivaraj
Regional Manager – Risk Engineering
Bharti AXA General Insurance Company Limited.
Chennai

Ten Loss Prevention Commandments for Thermal Power Plant Operations

1. **Coal Storages:** Following the "first in, first out" policy for storage and usage of coal, avoiding stocking of wet coal together with dry coal, use of dust proof type electrical fittings in covered coal storage and coal handling areas and strict implementation of 'Hot work' and 'Smoking Restrictions' in coal storage areas are to be followed.

2. **Coal Conveyors:** Recommend use of fire resistant material for conveyor belts that conform with IS 3181: 1992; regular cleaning of coal spillages over enclosed conveyor systems; having in place a rigid maintenance schedule for motors, conveyors, etc with special attention being given to maintenance of roller bearings of conveyors.

3. **Turbo-Generator:** Recommend use of fire resistant hydraulic fluids having auto ignition temperature of around 550°C as lubricating oils; storage of hydrogen cylinders outside the turbo-generator building (if located within to be stored in a separate well ventilated room that has exhaust facilities and if the plant makes use of a centralized storage facility for hydrogen provision of emergency shut off valve which can be operated from the control room installed in the supply line at an accessible location is necessary) and periodic check for hydrogen gas leakages at the generator and the sealing system using fixed or portable leak detectors.

4. **Cable gallery:** Use of Fire Retardant cables, ensuring that all cables are well laid on cable trays (loose /hanging cables are to be avoided) and sectionalizing cable galleries of individual units into separate fire compartments.

5. **Transformer:** Condition monitoring for major transformers by checking of oil and winding temperatures on an hourly basis, half yearly testing of transformer oil, and annual tests - for Dissolved Gas Analysis; insulation resistance of transformer windings and earthing systems are to be carried out.

6. **Boiler house:** Strict adherence to the preventive and predictive maintenance practices including servicing of oil guns with periodic replacement of copper gaskets, periodic checking of combustion controls, monitoring of Carbon Monoxide concentration at ESPs, physical supervision by plant personnel during and immediately after burner light up operation, and good housekeeping which ensures no spillage of

Pulverized coal or fuel oil is allowed to accumulate on the boiler structures, equipments or electric cables will contribute to fire safety in boiler areas.

7. **Occupational health hazard:** Recommend to have action plans that reduce occupational exposure by limiting exposure time through work rotation, adequate ventilation and sufficient drinking water facility in boiler areas for persons working in boiler areas. Use of warning signs along with shielding of surfaces where workers can come in to close contact with hot equipment, including generating equipment, pipes etc. and use of suitable local exhaust ventilation at dust generation points to keep dust below applicable guidelines help improve occupational hygiene. Usage of appropriate PPE by persons exposed to various occupational hazards is absolutely essential.

8. **Work permit system:** Recommend use of work permit systems such as electrical work permit, hot work permit, confined area entry permit and work at height permits as appropriate to the work being carried out.

9. **Fire detection:** Installation of fire detection systems like linear heat sensing cables in cable galleries, infra red/ flame detectors in conveyor belts, and smoke/ heat detectors at oil burner fronts of boilers, process control rooms, stores building, administrative offices, and IT/ Server rooms are necessary to facilitate early detection of fire.

10. **Fire Protection:** In a thermal plant, a well laid out hydrant system in line with TAC (Tariff Advisory Committee) regulations should form the basic fixed fire protection system covering the entire plant including fire vulnerable areas such as coal storages, main stores (where machinery spares and consumables are stored), and storage areas for flammable liquids such as diesel and furnace oil. In addition, automatic fixed fire protection systems such as automatic gas discharge Systems (CO_2 Protection System) for process control rooms, High Velocity Water Spray Systems for generator, main transformers and oil burner fronts of boilers and Medium Velocity Water Spray System for Coal carrying circuits (conveyor belts) and cable galleries and automatic sprinkler systems for main stores building and administrative offices are necessary.

2.0. SAFETY QUIZ

1. **"Detonation" is associated with**
   a. Sub-sonic shock velocities
   b. Ordinary heat and mass transfer
   c. Sub-sonic flame velocities
   d. Super-sonic Shock waves

2. **"Fault tree analysis" method seeks to identify**
   a. Incidents following an accident
   b. The root cause of an accident
   c. Incompatible vegetation inside premise
   d. None of the above

3. **HAZOP is a risk identification technique generally used for hazard assessment in**
   a. Construction sites
   b. Warehouses
   c. Chemical & Petro chemical factories
   d. Lift operations

4. **The following statement about LOPA is correct**
   a. LOPA means Layer Of Protection Analysis
   b. It is a semi qualitative analysis
   c. LOPA is applied when a scenario is too complex/consequence is too severe for HAZOP team to make a judgment based solely upon the qualitative information
   d. This method utilizes the data developed during HAZOP
   e. All of the above

5. **STOP, DROP &ROLL is a life saving technique**
   a. When our clothing catches fire
   b. During flooding
   c. During earthquake
   d. When there is a heavy rain

6. **While pumping fuel from a truck to a tank which of the following precautions should be carried out**
   a. Bonding and grounding of tank
   b. Even though the trucks are insulated with rubber tyres it is also to be bonded and grounded
   c. Allow few minutes before removing nozzles after pumping is complete
   d. All of the above

7. **Water can be used on an acetone fire in the form of a spray or fog in order to prevent spreading the fire**
   a. True
   b. False

8. **Smoke disables and kills faster than the flames of Fire**
   a. True
   b. False

9. **Ground Fault Circuit Interrupter is a device which shuts off the circuit even before the Fuse or circuit breaker is activated.**
   a. True
   b. False

10. **A confined space is any area that:**
    a. Has limited openings for entry and exit
    b. May contain or produce toxic air contaminants
    c. Has a high concentration of an inert gas
    d. Is not intended for continuous occupancy; and may have an oxygen-deficient atmosphere
    e. All of the above

Answers:

1	2	3	4	5	6	7	8	9	10
d	b	c	e	a	d	a	a	a	e

Ruchir Gupta

Zonal Manager – Risk Engineering

Bharti AXA General Insurance Company Limited.

Mumbai

3.0. Loss lessons: Fire in an Ink Manufacturing Facility

Date & Time of Loss: 14th June 2011 at around 9.30 a.m.

Occupancy: Ink manufacturing unit

Probable Cause of Loss : Nylosolv, a flammable solvent having flash point of around 63°C is generally used for cleaning purposes with one of its main uses being cleaning of inks sticking to printing plates in printing presses. Use of this solvent for cleaning the hot surfaces of the ink mill is supposed to be the cause of this fire.

Reported Loss: INR 40 lakhs

Premise: The premise is located in one of the well known commercial areas of Chennai, located adjacent to the Anna Salai which houses a lot of shopping complexes, offices, banks, automobile show rooms, etc. This particular building has 4 floors housing different occupancies in each of the floors. The second floor here is occupied by an Ink manufacturing unit. All other floors are occupied by banks and other commercial offices.

Incident: Fire was said to have been first witnessed in the ink mill immediately on pouring Nylosolv for cleaning its surface. Fire from here spread to other areas through the solvent barrels, thermal oil barrels and the plastic items like flex boards which were stored near the mill.

Items which were damaged by this fire include twenty 200 litre barrels of Nylosolv, five 200 litre barrels of thermal oil and the mixing and grinding machines that were located here. Fire fighting operations were carried out about 4 Hrs. using 10 Fire brigade vehicles and 6 Water tanker Lorries in addition to the 15 numbers of 50 litre foam cylinders that were used.

Loss Prevention Recommendations:

- Storage of flammable and combustible material should be done in a separate block or at least with proper segregation from the production facilities.
- Only trained operators should be allowed to operate the machinery. Cleaning of critical machinery by unskilled labour should be done only under the supervision of experienced operators.
- Electrical fittings in the production block/ storage yard where solvents are used should be of flameproof construction.
- Solvent storage area should be provided with sufficient ventilation to allow the vapours of solvents to escape so that build up of vapour clouds do not take place.
- Work areas should also be provided with adequate ventilation which will allow fumes to escape and facilitate unhindered fire fighting operations during an emergency.

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Response Invite:

We invite your feedback on the contents and coverage we provide in our e-newsletter as also articles of interest on safety and loss prevention including fire loss case histories with loss lessons for publication over here. You may send us your feedback and articles at risk.engineering@bharti-axagi.co.in .

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