CHAPTER 8

OCCUPATIONAL HEALTH AND SAFETY

8.1 Health and Safety Aspects

Plant operation will involve storage handling and use of fuels and several chemicals. Some of these chemicals may be hazardous in nature. Information about these chemicals is therefore important for the safety of the employees and the plant. Besides, the health status of the employees is also important which may be affected due to exposure to these chemicals. The exposures may be sudden and accidental or for a long period. In both the cases there will be different health effects. Therefore safety measures dealing with these chemicals are of vital importance.

Fuel Oil

Fuel oil will be used as alternative fuel for combustion in the boiler. Flammable liquids are classified as:

Extremely flammable liquids: Chemicals which have flash point lower than or equal to 23°C and boiling point less than 35°C

Very highly flammable liquids: Chemicals which have flash point lower than or equal to 23°C and initial boiling point higher than 35°C

Highly flammable liquids: Chemicals, which have flash point lower than or equal to 60°C and higher than 23°C

Flammable liquids: Chemicals, which have flash point higher than 60°C and lower than 90°C

The fuel oil stored in bulk is LDO/HFO. It is a flammable liquid with average flash point about 66°C. In case of fire, foam, Carbon dioxide or DCP can be used. Water is not much effective but can be used to cool fire exposed containers. If not ignited, water spray can be used to disperse the vapour and flush spill away from exposure area.

Main hazard in the storage areas and pipeline is serious fire due to any leakage of oil and its coming in contact with a source of ignition preventing measures;

- The storage tanks are constructed and maintained as per the guidelines laid down in the Petroleum Rules
- Regular scheduled inspections of storage tanks and the enclosed areas are carried out with regard to proper earthing, adequate fire fighting facilities, presence of any combustible material or growth of wild vegetation etc.
- No naked fires are allowed in and around fuel oil storage areas.

Dust Hazard

Dust can be major health hazard if not proper environmental management is carried out. As discussed before, coal stockyard, transfer points, coal handling and sizing plant, ash transfer can be sources of dust pollution. Dust control methods have been discussed before in **Chapter 2**.

Chemicals

Different chemicals like Chlorine, hydrochloric acid, sulphuric acid etc. will be required for water treatment, DM plant, effluent treatment, etc. These chemicals will be handled according to the directions provided by the manufacturers. Emergency bath and first aid facilities will be provided in the handling areas. Breathing apparatus shall be provided for workers handling chlorine.

Handling of hazardous chemicals involves risks to workers as they are constantly exposed to these chemicals during various operations and storages. In the event of an accident, not only the workers but also the general public can be exposed to dangers.

Some quick steps first aid and treatment for chemicals are given below:

Ingested: Dilute immediately by giving 200 ml of diluted milk of magnesia, diluted aluminium hydroxide gel, milk, raw egg, or water to drink. Do not give bicarbonate or carbonate.

Relieve pain and treat shock: Perform esophagoscopy promly to determine the presence of injury. Perforation, peritonitis, and major bleeding are indications for surgery.

Skin Contact: Flood with water for 15 minutes. Use on chemical antidotes; the heat of the reaction may cause additional injury. Relieve pain and treat shock.

Eye contact: Flood with water for 5 minutes, holding the eyelids open. Relieve pain by use of local anesthetic agent. Arrange for slitlamp examination.

Inhalation: Remove from further exposure to fumes or gas.

Check skin and clothing.

8.2 Personnel Safety

For safety of working personnel the following steps will be undertaken.

- All easily accessible moving parts in the plant will be securely fenced.
- There will be arrangement for prompt power cut from transmission equipment, if necessary.
- Every hoist, crane etc. will be properly maintained and examined at intervals.
- All working places will have safe means of access and exit.
- Emergency fresh water bath will be provided in the hazardous chemical handling areas e.g. storage areas and operating unit areas.
- All personal safety equipment like gloves, helmet, goggles etc. will be worn in the required place.
- Boilers will be examined in proper manner by proper authority as per statutory requirement

A list of personnel protective equipment is given in Table **8.1**.

Table 8.1
Personnel Protective Equipment

PROTECTION FOR	EQUIPMENT	PROTECTION AGAINST
HAND	a) Leather gloves b) Asbestos gloves c) Electrical resistance gloves d) Canvas gloves e) Hand sleeves	Cuts due to handling Heat radiation Electrical shock Contact with oil & grease etc. Falling of hot slag
LEG	a) Leg-guards b) Leather safety boots c) Asbestos safety boots	Welding sparks Striking by objects, fall of objects and stepping on sharp or hot objects Heat radiation, stepping hot or sharp objects and stepping on sharp or hot objects
EYE	a) Spectacle type goggles with plain shatter proof lens	Foreign bodies entering the eyes and reflected arc rays
HEAD	a) Fibre Helmet	Fall of objects/hitting against objects during construction, maintenance etc
EAR	a) Ear plugs or muffs	High noise level
NOSE	a) Dust protection mask	Fine dust particles

8.3 Medical Surveillance

Medical surveillance has been prescribed in the Factories Act, 1948 (Amended). Under section 41C, it is stated that "every occupier of a factory involving any hazardous process shall:

"Maintain accurate and upto-date health records or, as the case may be, medical records of the workers in the factory who are exposed to any chemical, toxic or any other harmful substances which are manufactured, stored, handled or transported and such records shall be accessible to the workers subjected to such conditions as may be prescribed and Provide for medical examination of every worker, (a) before such worker is assigned to a job involving the handling of or working with a hazardous substance and b) while continuing in such job and after he has ceased to work in such job, at intervals not exceeding twelve months, in such manner as may be prescribed."

The company will follow these guidelines to ensure a healthy work environment.

8.4 Fire Safety

For protection of the plant against fire, all yards and plant will be protected by any one or a combination of the following systems: -

a. Hydrant system

b. Automatic high velocity and medium velocity sprinkler system

c. HV & MV water spray (Emulsifier system)

d. Existing fire fighting facilities would be integrated with the proposed system to ensure central control from the existing fire station. The fuel oil tanks will be provided with automatic fixed foam system and hence only extension of the same for the new tank would be necessary.

e. Portable and mobile chemical extinguishers

The system will be designed as per recommendation of Tariff Advisory Committee (TAC) of the Insurance Association of India. Applicable Codes and Standards of National Fire Prevention Association (NFPA), USA, would also be followed.

In view of vulnerability to fire and its importance in the running of the power station, effective measures are to be taken to tackle fire in the following susceptible areas:

i) The cable galleries, and

ii) Coal handling areas, mainly coal conveyors, transfer points, and tunnels.

For containment of fire land preventing it from spreading in cable galleries, unit-wise fire barriers with self-closing fire resistant doors will be provided. The ventilation systems, if provided in the cable galleries, would be so interlocked with the fire alarm system that in the event of a fire the ventilation system is automatically switched off. Also to avoid spreading of fire, all cable entries/openings in cable galleries, tunnels, channels, floors, barriers etc. would be sealed with non-inflammable/fire resistant sealing material.

The source of water for the fire water pumps of the hydrant system, water spray and sprinkler system etc. will be clarified water. Two (2) electric motor driven fire water pumps with one (1) diesel engine driven pump as back-up for sprinkler system will be provided in the CLW pump house. In addition to these, jockey pump sets, hydro-pneumatic tanks, compressors, pipes and fittings as required will be provided. The hydrant system will feed pressurized water to hydrant valves located throughout the plant and also at strategic locations within the powerhouse. The hydrant system would be interconnected with the firewater ring mains of the existing plants.

Automatic high velocity sprinkler protection system will be provided for cable galleries, cable trenches/vaults, coal conveyors etc. Automatic medium velocity sprinklers will be used for protection of burner zone of boiler front.

Automatic type water spray (emulsifier) protection system would be provided for the following equipment: -

a. Generator transformers
b. Unit auxiliary transformers
c. Station reserve transformers
d. Turbine oil storage tanks

Suitable fire detection system as necessary for all the above mentioned fire fighting system with adequate supervisory circuitry will be provided. In addition to these, adequate number of portable and mobile (wheel mounted) chemical fire extinguishers of foam and soda acid type and carbon-dioxide type will be provided. Portable units would be placed at suitable locations throughout the plant area. The extinguishers may be used during the early stages of fire to prevent spreading.

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