

## **SAFETY INSTRUCTIONS FOR PERSONNEL**

NTPL Units (2x500MW) are designed to provide reliable operations. That includes integral features which protect the equipment from damage and malfunctions. O&M personnel must become thoroughly familiar with these safety instructions by reading manuals supplied by OEM's/OES's and must observe these requirements throughout all procedures of plant Operation & Maintenance. Maximum safety of personnel must be of primary importance, followed closely by protection of equipment from damage. Careful observation of the requirements for safe operation of the equipment will minimize hazards to personnel.

These Safety instructions also include procedures to be observed in the event of certain operating malfunctions and special precautions for explosive atmosphere.

First aid procedures given here are not all inclusive, and represent only those procedures essential for preservation of life. A doctor must always be summoned in the event of personal injury.

According to me, safety is everyone's responsibility. All employees have 'stop work' authority, a right that helps us prevent accidents and drive continuous improvement in NTPL.

The following recommendations are advised to be followed for safe operations of Unit / Plant systems to avoid any incidents during O&M phase.

**General Manager  
Operation & Maintenance**

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## **SAFETY INSTRUCTIONS (WALK DOWN)**

A preliminary walk-around visual safety inspection of the site shall be performed prior to start of any operation procedures or maintenance works. This inspection shall include applicable items listed below as well as any other which may be peculiar to the installation. Any actual or potential hazard must be corrected before proceeding.

- Determine location of emergency shutoff valves, switches, telephones, emergency shutdown provisions, etc.
- Learn special emergency procedures applicable to specific installation.
- Observe location and learn operation of fire extinguishers and other emergency and protective equipment.
- Look for safety hazards, such as leaking gas, sour gas, condensate in drip pans, drain lines, etc. high voltage, high pressures, other obvious hazards.
- Verify that equipment and vicinity are clean and unobstructed; check inlet and vent lines for obstructions.
- Determine if personnel are working on other equipment in area and whether such work is of hazardous nature that precludes work on the equipment.
- Emergency exit door to be known for safe evacuation in case of emergency.
- Ear muffs to be worn while walk down in high noise area to protect against noise induced hearing loss
- The Plant personnel deployed by NTPL or by their authorized O&M service provider at different levels should have adequate and relevant experience as per duties involved and they should be able to effectively handle all plant operational aspects and exigencies likely to occur in the plant operation

## **SAFETY INSTRUCTIONS (GENERAL CAUTIONS)**

The order of listing here does not indicate the order of importance; each item is important to overall personnel safety, Failure to obey these messages could result to serious injury.

- Never work alone. Be sure that other personnel are in close proximity.
- Never deactivate automatic shutdown devices: this protection is incorporated to prevent injury to personnel and damage to equipment.
- When working on a non-operating equipment, always lock out machine by opening control circuit breaker and ensure master control switch of OFF. Attach temporary DO NOT START tag to control switch to warn against inadvertent closing of switch.
- Check that operation of switches and valves cannot endanger personnel and/or equipment.
- Do not allow any bare wiring on or in vicinity of equipment.
- Do not step on electrical conduit or junction boxes or use them as supports.
- Insert grounding rods in a suitable location to prevent tripping and injury to personnel.
- Do not allow smoking, open flames, or spark-producing devices in vicinity of generator at any time.
- Protect ears by using ear plugs against high noise level during operation.
- Wear hard hats, protective goggles, ear plugs, protective footwear, protective clothing, etc., to avoid a hazardous situation.
- Eliminate any steam or oil leaks as soon as detected.
- Check that system pressure is zero before disconnecting any system lines.
- Stand clear of all pressure lines and fittings during start of unit.
- Wear suitable equipment (masks, goggles, gloves, etc) and observe proper fire precautions when using cleaning solvents or solutions. Avoid skin contact with solvents or solutions, and inhalation of fumes.
- When performing welding or cutting procedures on equipment, observe requirements in applicable standards.

- Discharge all high-voltage circuits by using a heavy insulated cable, and short each phase to ground before working on or around equipment; residual voltages which could be stored and maintained for several hours after shutdown can kill you from lethal electric shock.
- Take corrective action or report to your Reporting Officer/Shift In-charge, any uncovered or unguarded holes or openings. These holes are to be securely covered or barricaded.
- X-rays and gamma rays are used for the examination of welds & areas to be barricaded. UNDER NO CIRCUMSTANCES UNAUTHORIZED PERSONNEL PASS BEYOND AREAS WHICH IS BARRICADED.
- Avoid personal contact with hot sections of equipment.
- Use lifting aids or get assistance to lift heavy or bulky loads. Adopt the practice of bending your knees and lifting with your leg muscles. The repetitive stooping or bending of your back, even without a load, with eventually lead to back injury.
- The order of listing here does not indicate the order of importance; each item is important to overall equipment safety. Failure to obey these messages could result in damage to or destruction of equipment.
- Cap all open lines and fittings during maintenance to prevent entry of contaminants into systems. DO NOT USE TAPE.
- Keep equipment and vicinity clean and unobstructed. Keep maintenance work areas clean to ensure clean assembly. Cleanliness is important due to high speeds and close tolerance of turbine parts.
- Do not overfill oil tank. Ensure that oil tank vent clearance is maintained and vent exhaust is directed to top roof.
- Do not flex cables unnecessarily; repeated flexing or wiring connections will contribute to early fatigue failure.
- Keep covers, door and panels in place and explosion-proof enclosures closed, with all fasteners installed and tightened when access is not required.
- When disconnecting electrical cables, do not pull cables; break connections by grasping connectors only.

- Verify that check valves and other flow devices are installed in correction direction of flow.
- Ensure that any system which is unsafe to operate is locked out and controls & switches are tagged with DO NOT OPERATE tag.
- Proper air circulation and DG light to be ensured while working in confined space.
- Local area and control room log books should be filled in a proper manner indicating prevailing status of key plant / unit parameters, operating parameters of major equipment / systems and shift activities should be entered in a chronological manner without any ambiguity which shall be checked by Sr. Executives of NTPL during walk down.

## **SAFETY INSTRUCTIONS (OPERATION)**

- Do not allow turbine to be rotated in a direction reverse from normal rotation: reverse rotation can cause serious damage to turbine.
- When MSV, RSV and ICV valve testing, valve stem is in partial position(not full open position) and then the valve stem backseat is disable. In such condition, high temperature steam leak flows out along the valve stem. Operator should take care not to be subject to the leak steam when observing the valve stem movement, otherwise they will be severely injured by high temperature steam.
- Do not let steam admit to the seals if the rotor is not turning. Failure to observe this rule will result in a bowed rotor.
- On emergency where the shaft cannot immediately be rolled by turning operation, every effort should be made to get the unit on turning gear as soon as possible. If the turning gear will not turn the shaft, never admit steam to the turbine to try to turn it, otherwise the rotor will buckle.
- If the gland steam pressure is lower than predetermined limit, open the steam seal feed valve bypass valve gradually, otherwise rotor vibration would occur.
- The matter in detail is explained in O&M Manual.
- Operation at low loads which require the use of LP exhaust spray water should not be prolonged without necessity because of increased rates of moisture erosion of the later stage blades.
- Upon the all-pump testing, verify that; each of the tested oil pumps are stopped and their AUTO/MANUAL modes are in the "AUTO" position, otherwise pump does not start automatically after testing. All automatic pump starting test valves are in the normal position.
- Do not attempt to push two PB simultaneously. The interlock is designed to prevent such a situation occurring but if the interlock fails and two of the controllers are activated at the same time, the turbine will trip immediately.

- Testing of backup over speed trip and testing of governor control range (every time after overhaul)
- Avoid an over speed operation of cold turbine. If the turbine starts in ambient cold mode, do not over speed the turbine until the turbine operates for over 3 hours above 25 percent load.
- The starting and loading instructions, require that, "After a cold start the turbine should not be over speeded until it has carried 25 percent or greater load for at least three (3) hours because the temperature of the metal at the turbine rotor centre will be below transition temperature when first coming to speed", otherwise the life of rotor will be shortened.
- It is the recommended practice to conduct a number of control system checks above rated speed prior to synchronizing either a new turbine generator unit or an older unit following a major overhaul. These involve operation at speeds up to the emergency governor trip speed, where the stress on the turbine rotor is approximately 25 percent greater than at 100 percent speed. Increased knowledge and understanding of rotor material behaviour has let us to determine that this practice is not desirable on cold turbines.
- The alloy materials used in turbine rotors for high temperature operations have more margin to withstand the stresses imposed by over speed operation when they are above their transition temperature. The centre of the rotor on a cold turbine will not reach to the transition temperature by the time the turbine is at rated speed. During acceleration and operation at rated speed, no load, the steam pressure in the turbine is low and the heat transferred to the rotor is not sufficient to adequately heat the rotor centre to the transition temperature. Thus, it is not allowed to impose the added stress on the cold rotor by going to over speed until all the metal in the rotor has been heated to transition temperature or higher. In order to raise the rotor centre temperature to a level which can result in the transition to the more ductile condition, it is necessary to apply load to the unit for a period of time. Operation at 25 percent load for three (3) hours will accomplish the desired heating, otherwise the life of rotor will be shortened.



- In accordance with present procedures, it will be necessary to synchronize the relatively cold unit following desired operation in soaking at rated speed and before any over speeding. Then, after three (3) hours of operation with at least 25 percent load, it will be necessary to remove load from the unit and complete the control system checks that are necessary at above rated speed, including calibration of the emergency governors, otherwise the life of rotor will be shorten.
- Standard Operating Procedures (SOP) and Local Management Instructions (LMI) must be prepared before COD and shall be reviewed periodically. Plant operating instructions to be followed in dealing with various situations of plant operation should be in line with OEM recommendations. Further the plant operating guidelines should emphasize on safety aspects and compliance of good practices directed towards avoid risky plant operating conditions.
- The manhole / scaffolding door provided at bottom of the furnace should not be opened while boiler in operation.

### **SAFETY INSTRUCTIONS (FIRE PROTECTION)**

- The basic elements necessary for the production of fire are fuel, oxygen(air), and an ignition source. Prevention means keeping any of these elements away from the other two.
- Various backup firefighting facilities must be available on site. You must not interfere with this vital equipment. Fire hydrants, hoses and extinguishers are exclusively for the fighting Of fires. Ensure that any empty or faulty equipment is pointed out or handed to your supervisor.
- Make personnel familiar with all the firefighting equipment in the area. Never use conductive extinguishers such as water or foam on electrical fires.
- Prepare necessary communication system for reporting any fire detected.

| Class of fire | Material involved   | Method of extinguishment   | Most suitable extinguishing agent |
|---------------|---|----------------------------|-----------------------------------|
| <b>A</b>      | Solid combustible material e.g. wood, paper, plastic, rubber, grass and coal etc. | Cooling, starvation        | Water                             |
| <b>B</b>      | Flammable liquids e.g. petroleum products, and oils etc.                          | Smothering, starvation     | Foam, DCP, C02                    |
| <b>C</b>      | Flammable gases e.g. methane, LPG, Ethylene and LNG                               | Starvation                 | C02, DCP                          |
| <b>D</b>      | Reactive metal fires e.g. Na, Ti, Mg, Uranium, Zirconium etc.                     | Smothering, chain breaking | Special DCP, TEC etc.             |

### **SAFETY INSTRUCTIONS (WELDING AND CUTTING)**

- Obtain an approved hot work permit prior to performing welding or cutting operation in non-designated areas.
- Oxygen and acetylene cylinders must be secured at all times, used in the upright position and transported using approved lifting boxes or cradles. They must never be lifted or lowered using a sling.
- Precautions must always be taken to prevent eye damage from welding arc flash and to protect you and combustibles from falling sparks and hot metal.
- Adequate ventilation is to be provided in areas where fumes are likely to accumulate.
- Switch off electric welding equipment at the main switch when you are finished. Connect the earth return as near to the weld point as possible keeping in mind electrical cabling, bearings and motors that can be damaged through stray currents
- Do not use welding and cutting gear unless you are qualified in their use. Report defective equipment to your supervisor — it may result in injury or fire if not corrected.
- All welding leads must be in good condition with all insulation intact and no bare metal showing along the entire length.
- Fire extinguisher and fire blanket should be available where welding perform near other facilities.

### **SAFETY INSTRUCTIONS (ACCESS LADDERS)**

- Use ladders that are whole, undamaged and of approved construction.
- Ladders are to be secured during use, if it is essential to use a ladder before it can be secured, a second person must hold it steady at all times.
- Ladders must not be spliced or used as scaffold/work platform components. When used as access to elevated work areas, a ladder must extend one metre above the stepping-off point and be placed at an angle where the base of the ladder is one quarter of the ladder height away from the base of the scaffold or structure.
- Ladders with wire reinforced side rails or those with metal construction must not be used nearer than three metres to any exposed electrical power source and never in substations or on electrical installation works.
- Timber ladders must not be used.
- Maintain three points of contact when climbing and whenever possible at work position.
- Always grip the ladder and face the ladder rungs while climbing or descending.
- Do not overload ladder — consider workers' weight and the equipment or material they are carrying before working at height.

## **SAFETY INSTRUCTIONS (SCAFFOLDS AND WORK)**

- All scaffolds, landings, and work platforms must be provided with an access ladder that extends at least one metre beyond the stepping-off point : this provides you with a secure handhold when getting on and off the ladder.  
All access ladders must be secured so that the tie encompasses the stiles and one rung.
- All scaffolds/work platforms at or above 2.4 metres from the nearest horizontal plane must be fitted with rigid guardrails at a height of one metre from the work platform and completely encompassing the area of the work platform.
- If your activities require you to work outside of a safety hand-railed area, a safety belt secured to a suitable anchor must be used.
- Base plates and sound foundation material must be used for scaffold footings.
- The height of a mobile scaffold shall not exceed three times the minimum base dimension.
- All scaffold planks and kick boards are to be adequately secured. • All scaffolds must be erected by a certified scaffolder.

### **SAFETY INSTRUCTIONS (CRANES AND HOISTS)**

- Only those persons authorized and licensed may operate, or direct the operation of cranes and hoists.
- Start and stop slowly.
- Never leave a load suspended without an authorized operator at the controls.
- Riding on hoists, hooks or loads, is strictly prohibited.
- All outriggers are to be used when lifting and lowering loads. Do not attempt to lift a load without first determining its weight and correct lifting gear.
- All loads hooks on cranes and hoists must be fitted with a device to prevent load displacement.
- All components used in lifting tackle must be able to lift an adequate safe working load and be in sound condition.
- Conduct periodic load test of cranes and hoists.

### **SAFETY INSTRUCTIONS (ELECTRICAL TOOLS)**

- Faulty power tools are the most common cause of electrical accidents in construction work. Check them and their fittings and leads prior to and during each use. Report any defective electrical equipment to supervisor.
- Only qualified electricians are permitted to make repairs to electrical tools, plugs, fittings and leads.
- Extension leads shall be kept as short as possible and, as far as is practicable, kept clear of the floor or ground. They are to be kept dry at all times.
- All electrical tools and leads shall be inspected and tagged by a qualified electrician at six-month intervals.
- Never lift or carry a power tool by its lead. A ground wire pulled out and making contact with a live wire causes the metal casing of the tool to become live, this is very dangerous and could result in electrocution.
- No portable power tool is to be used without the protection of SAFETY SWITCH (formerly known as an Earth Leakage Circuit Breaker or a Residual Current Circuit Breaker) that is set to trip in the event of any leakage to earth. Each unit must be tested daily.

**SAFETY INSTRUCTIONS**  
**(HAZARDOUS AND DANGEROUS SUBSTANCES)**

- Read the safety instructions on the containers of all materials in use and follow these precautions. If you are uncertain of the properties of any material, ask your supervisor for instructions.
- Hazardous substances are to be stored and used carefully. All empty and used containers and substances must be returned or correctly disposed of according to the project waste disposal procedures.
- All personal protective equipment required to be used during the handling of hazardous substances must be worn.
- Prior to the use of hazardous substances, be sure that the correct medical and spillage counter measures are readily available.
- Comply with all safety precautions and instructions relating to hazardous substances.



## **SAFETY INSTRUCTIONS (ACCIDENTAL FALLS AND DROPS)**

- Stop working at an elevated spot if possible, and work on the ground if you can by utilizing appropriate safe working procedures.
- When you must work at an elevated spot, do it on a work floor by setting up a scaffold or using a rolling tower.
- Use prescribed protective equipment and do not act recklessly.
- Use a work floor that is wide enough so as not to cause inconvenience and fasten it securely to supports to keep it from sliding down.
- When circumstances do not allow handrails to be placed on a work floor, use such safety precautions as wearing a safety belt, and setting up a safety net for preventing an accidental fall.
- Do not put articles on a work floor because the space is restricted and workers may stumble over the articles and fall or drop something they are carrying.
- Let two workers do work that requires the use of a ladder or stepladders if possible. One worker should support the ladder or stepladders and keep watch while the other is at work.
- Pay attention to weather conditions, including rain and wind, and avoid working on an elevated spot in bad weather.

## **SAFETY INSTRUCTIONS (FIRST AID)**

The following instructions for rendering first aid in the event of injury represent a brief outline of basic procedures for first aid assistance in emergencies. The more

comprehensive procedures, such as given in a Red Cross First aid manual, or equivalent, should be read and noted before the need for such action occurs. In all cases, medical assistance must be obtained as soon as possible.

Render first aid with care to avoid further injury, and only to extent required until arrival of medical assistance.

#### Electrical shock

1. Turn off electricity source. Do not touch victim with bare hands until circuit is deenergized.
2. Remove victim from hazard. Use dry insulating material: dry leather, wood, rubber, etc. for protection when removing victim.
3. Remove false teeth, chewing gum etc. from victim's mouth, then perform mouth to mouth resuscitation if breathing has stopped and no pulse is discernible.
4. Obtain medical assistance.

#### Inhalation of Toxic Gases

1. Remove victim from hazardous atmosphere.
2. Give artificial respiration.
3. Obtain medical assistance.

#### Explosion, Burns, Broken Bones etc.

1. Hemorrhage and wounds
  - a. Control bleeding by direct pressure at pressure points.
  - b. Use tourniquet only if other means are unsuccessful: use with care to avoid further injury.
  - c. Treat for shock: place victim in reclining position and keep warm.
  - d. Obtain medical assistance.
2. Broken bones
  - a. Immobilize break by applying splint before moving.
  - b. Obtain medical assistance.
3. Burns
  - a. Cover lightly with sterile dressing.
  - b. Do not remove charred clothing
  - c. Obtain medical assistance

### Sulphuric (or other) Acid

#### 1. Skin

- a. Immediately flush with water for at least 15 minutes.
- b. Obtain medical assistance.

#### 2. Eyes

- a. Immediately flush with copious amounts of water for at least 15 minutes.
- b. Do not attempt to neutralize
- c. Obtain medical assistance.

### CONTENTS OF A FIRST-AID BOX

|    |                            |
|----|----------------------------|
| 1. | Band-Aid (Water proof)     |
| 2. | Iodine Tinc 20ml           |
| 3. | Povidone iodine oint 20gm  |
| 4. | Surgical cotton 50gm       |
| 5. | Rolled bandage 15cm x 10cm |
| 6. | Sivebact cream 15gm        |
| 7. | Bectodine 5% 100ml         |

## **SAFETY INSTRUCTIONS (ROTARY DRIVE)**

- a) The electrical power to the rotor drive unit and shoot blower unit has been isolated.
- b) The local compressed air and valve at the air motor should be secured in the off position, after the air motor is equipped.
- c) Surface temperature of gas air heater is below 40%.
- d) Oxygen level inside gas air heater to be checked before any person enter the gas heater.

Ensure that all maintenance debris is removed otherwise it may interfere with rotation of the rotor, damage the rotor seals and be a fire hazard.

Head(excessive) contact any of the rotor seal (post, radial, axial, bypass) with sealing surfaces can seriously damage. The seals, once the rotor begins rotated.

Never approach to touch any rotating parts (shaft, coupling etc.) during operation.

Loose clothing cut in these rotating parts may result in severe injury.

Once the washing process in air pre heater is started, it is very important to continue the process until the heating element is cleaning and dry. Ash accumulation left after washing may harden on the element sheet and be difficult to remove with conventional cleaning method.

Water should never be administered to the heating element, with the air pre heater in operation unless the fire has been visually by the operator.

## **SAFETY INSTRUCTIONS FOR SERVICE PROVIDERS**

- A. The O&M service providers is required to ensure compliance with provisions of all the Acts/Rules that provide for safety measures such as:
1. Electricity Act/Rules
  2. Boiler Act/Rules/Regulations Explosives Act/Rules
  3. Petroleum Act/Rules
  4. Motor Vehicles Act/Rules
  5. Dangerous Machines (Regulation) Act Environment (Protection) Act/Rules Mines Act/Rules, etc.
- B. The Work Permit system (PTW) for undertaking O&M activities should be endorsed by NTPL's representatives from Operation & Maintenance departments. The protocol of work permit for carrying out any activity in the unit should be strictly adhered to.
- C. The persons working in Boiler / Ash handling area should be provided with thermal wear which can withstand high temperature and flame proof clothing for the people working near furnace area.
- D. While attending any problem during boiler operation, clear practice of having a check list for the safety practice should be adopted. This should be approved by head of O&M and Safety departments with final approval of CEO .
- E. Service provider should not resort to any maintenance work when boiler is in operation endangering human safety. If the problem is not fully resolved / beyond correction, the boiler should be stopped for undertaking the maintenance work. In this respect, proper communication should be made by the service provider and insisted upon to shut down the unit so as to avoid risky plant operating conditions.
- F. Separate Shift in-Charge (Safety) should be posted by the Service Provider in each shift to oversee there should not be Unsafe Act done by their workers or their workers are not working in any Unsafe Condition.

#### G.HOT WORK:

- An approval process for work involving heat must be implemented in conjunction with the PTW system including CISF (Fire) personnel.
- The conditions for undertaking work involving heat must be defined, e.g. welding and grinding.
- Precautions that are to be taken prior to granting the approval for work involving heat.
- The atmosphere must be checked for explosive gas mixtures before and during the work.
- The surrounding area around the welding must be free of flammable substances (e.g. liquid or gaseous fuels, plastic sheeting, wood).
- Welding protection sheeting must be used to protect against damage due to falling sparks.
- Welding equipment must be correctly earthed.
- Portable fire extinguishers with the correct fire class must be available.
- Additional PPE: welding safety goggles/face mask, protective gloves and protective clothing for welding.
- Requirement on the qualifications of the personnel: qualifications/certificates to suit the technology used (e.g. arc welding, inert gas welding).

#### H.Work inside Confined Spaces:

For Example.

- Spaces with restricted entry or exit area, e.g. access via manholes
- Spaces in which toxic gases or flammable gases/smoke can collect
- Spaces with insufficient supply of oxygen/fresh air.
- Air intakes / Blow-off ducts / Exhaust / vent pipes / Drainage ducts / Lube oil tanks • An authorization process for access approval to confined spaces must be implemented in conjunction with a work approval system.
- It must control the access to confined spaces in which the supply of air and escape routes are restricted. The authorisation process must include as a minimum the following points:
- Precautions that are to be taken prior to granting the access approval to confined spaces , components that can cause a hazardous situation must be shut off (e.g.

fuel supply, pressurised oil supply, rotor lock) , the atmosphere must be monitored for gas concentrations (e.g. O<sub>2</sub>, CO, CH<sub>4</sub>) , An adequate air supply must be ensured (e.g. fans) • Precautions during the work: Personnel must be present at access doors and/or manholes at all times during the work to secure the access Appropriate means of communication must be available (e.g. 2-way Walkie talkie )

#### J. Radiological test methods

Non-destructive radiological tests/x-ray tests on equipment are used to test the quality of weld seams etc. A radiological test method must comply with local requirements and guidelines. The method must also define the access restrictions and marking of the test zone in compliance with local guidelines and legal requirements. All safety-related points for such test are to be followed.

#### K. Safety conditions for maintenance work:

Prior to starting the maintenance work, make sure the equipment's and all system interfaces are closed, free of residual liquids, depressurized, cooled and secured against unintentional switching-on. The following safety instructions are to be followed at all times and under all circumstances. Failure to follow these instructions can result in serious injury, including fatality, and/or serious damage to the machine.

- The machine must be checked for cleanliness after undertaking maintenance or repair work and prior to restarting the machine. All the necessary cleaning work is to be completed.
- Knowledge in relation to the tools and equipment and their correct usage is a prerequisite.
- To prevent housing distortion, the fasteners at the parting lines and joints must be undone and tightened in the correct sequence.
- To prevent the ingress of foreign objects during disassembly, all pipe and housing openings must be sealed using the approved maintenance covers.
- During reassembly, the blind plates are only to be removed immediately before the connection of the sealed pipe or housing opening.
- All O-rings, sealing rings, seals, locking plates and spring washers removed during disassembly must be renewed.

- All fasteners on which the weld seam has been ground off during disassembly must be renewed.
- After shut-down of TG, the shaft train on the turbo-generator set must be turned using the rotor turning gear until the turbine set has cooled down to less than 50 °C. Otherwise, rotor distortion may occur.
- Fire hydrant pumps shall be tested weekly and fire hydrant jockey pumps shall be tested daily in each shift.
- Fire tenders shall be inspected daily in each shift and adequate manpower for each shift shall be employed.
- All external fire detection shall be checked quarterly and all heat and smoke detectors annually tested.

L. Ash Handling Plant and Associated Sub-System:

- (i) Bottom Ash System. — Bottom Ash handling system, after burning grate, Slag bath, submerged conveyor, elevated conveyor, bin or silo shall be properly maintained.
- (ii) Ash Bund or Dyke. — Maintenance inspection of Ash Dyke shall be carried out every alternate day.

M. Fuel Oil Unloading System:

Electrostatic charges accumulated in the Bowser Lorry during movements or transportation has to be discharged by the drivers before unloading fuel oil, using a discharge rod, to prevent Explosions.

N. DM Plant:

External inspection of the acid and alkali storage tanks shall be done once in six months.

O. Cooling Tower (NDCT):

Cooling Tower concrete structure shall be inspected during annual maintenance by a designated Civil Engineer.



P. Diesel Generator: Diesel Generator system shall be checked daily

Q. Life Saving Equipment's: Regular check to ensure the availability of life saving equipment's to protect SG and TG from major damage.

R. Fire safety: Since fires at power plants can lead to fatal consequences, a proper well-equipped firefighting system is a key requirement in any thermal power station. The most common fires are usually caused by human activities such as human errors, faulty designs or mechanical failures. However, several fire incidents can be prevented and damage minimized by improving the reliability of firefighting equipment. An effective, documented inspection, testing and maintenance programme can help to ensure that the system does not fail when needed in an emergency. Firefighting systems include a combination of mechanical and electrical components, and their availability must be ensured on regular basis.

### **Conclusion:**

It is imperative for power plant HODs & Managers to have procedures in place that provide guidelines for employees to perform various tasks safely. Proper upkeep of safety and firefighting systems, safety audits, mock drills, and employee training and awareness are key to preventing accidents and ensuring safety at the power plant premises.