

Power Plant Fire Losses

India

Period: 1988 to 2002



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Major Fire Loss 1

- Brief Description of plant: *2 x 60 MW + 3 x 110 MW Thermal Power Plant, Tamil Nadu*
- Location of fire: *Electrical Cable gallery*
- Date, time of loss: *10/10/1988*
- Estimated loss: *Rs. 62 lakhs*
- Probable Cause of fire: *Either external ignition source brought inside cable gallery or cable fault leading to fire*
- Loss Prevention recommendations:
 - Cable passes in each floor to be sealed
 - Install fixed fire protection for cable gallery- medium velocity water spray system, Linear Heat Sensing Cable –LHSC for heat detection
 - Drainage facility to be provided for fire fighting water on each floor
 - Maintain fire hydrant system at all times

Major Fire Loss 2

- Brief Description of plant: *4 x 110 MW + 1 x 210 MW Thermal Power Plant, Haryana*
- Location of fire: *Coal Handling plant*
- Date, time of loss: *05/06/1992*
- Estimated loss: *Rs. 60 lakhs*
- Probable Cause of fire: *Spontaneous ignition of coal*
- Loss Prevention recommendations:
 - *Monitor coal stack temperature*
 - *Install water- based fixed fire protection*
 - *Install LHSC for coal conveyor*
 - *Maintain fire hydrant system at all times in the coal storage yard*

Major Fire Loss 3

- Brief Description of plant: *3x200 MW + 2 x 500 MW Thermal Power Plant, West Bengal*
- Location of fire: *Generator Transformer*
- Date, time of loss: *21/04/1995, 22.44 hours*
- Estimated loss: *Rs. 65 lakhs*
- Probable Cause of fire: *Probably due to an internal fault. Exact cause could not be ascertained*
- Loss Prevention recommendations:
 - *On-Line Dissolved Gas Analyser*
 - *Install Mulsifier system/Nitrogen purging for fire protection, Linear Heat Sensing Cable cable for heat detection*
 - *Install drain piping with valves*
 - *Carry out inspection 7 maintenance of transformers as per IS-10028- 1981, part III*

Major Fire Loss 4

- Brief Description of plant: *7x 210 MW Thermal Power Plant, Tamil Nadu*
- Location of fire: *Boiler House*
- Date, time of loss: *03/10/1995*
- Estimated loss: *More than Rs. 50 lakhs*
- Probable Cause of fire: *Leaking oil from burner ignited by hot surface*
- Loss Prevention recommendations:
 - Preventive maintenance of oil guns to include periodical replacement of copper gaskets
 - Supervision by plant personnel during oil burner light up

Major Fire Loss 5

- Brief Description of plant: *2 x 500 MW Thermal Power Plant, Orissa*
- Location of fire: *Turbo-Generator*
- Date, time of loss: *04/10/1995*
- Estimated loss: *More than Rs. 50 lakhs*
- Probable Cause of fire: *Could be due to the Hydrogen-air mixture*
- Loss Prevention recommendations:
 - *Installation of water spray system suggested at the turbine floor*
 - *II C Flame proof equipment in areas where Hydrogen is handled*

Major Fire Loss 6

- Brief Description of plant: *3 x 88 MW Gas Turbine + 1x 149 MW Thermal Power Plant, Maharashtra*
- Location of fire: *Inside damper chamber of Gas turbine*
- Date, time of loss: *08/07/1996, 21.13 hrs*
- Estimated loss: *Rs. 500 lakhs*
- Probable Cause of fire: *Explosion of Naphtha vapour inside damper. Source of ignition could be sparking generated for establishing pilot.*
- Loss Prevention recommendations:
 - Possibility may be explored to check flammability of fuel gas (in damper chamber) while starting up of a unit after starting up of unit after any unsuccessful trial
 - Designing of logic system of turbine start up may be re-checked to incorporate the draining of Naphtha, if required from the casing of Turbine and the timing of the same should be logged in the data acquisition system
 - Purging cycle should be rechecked and it should be at least equivalent to 8 air changes.

Major Fire Loss 7

- Brief Description of plant: *2 x 67.5 MW Thermal Power Plant, Madhya Pradesh*
- Location of fire: *Turbo-Generator*
- Date, time of loss: *14/12/1996, 12.45 hrs*
- Estimated loss: *More than Rs. 50 lakhs*
- Probable Cause of fire: *Failure of insulation causing fault at generator windings, leading to short circuit*
- Loss Prevention recommendations:
 - *Proper condition monitoring of the generator suggested*
 - *Maintain history cards of critical machinery. Details of physical observations made during dismantling / overhauling of the machines, rectification carried out, parts changed, may be maintained in a structured manner to facilitate better maintenance & operation*

Major Fire Loss 8

- Brief Description of plant: *2 x 500 MW Thermal Power Plant, U.P.*
- Location of fire: *Current Transformer*
- Date, time of loss: *09/05/1997 (04.20 hrs)*
 - 21/05/1997 (12.30 hrs)*
 - 25/05/1997 (18.30 hrs)*
 - 27/05/1997 (18.25 hrs)*

In succession

- Estimated loss: *More than Rs. 50 lakhs*
- Probable Cause of fire: *The CT was subjected to high voltage peaks. This voltage peak also generates hysteresis 7 eddy currents, which may cause damage by overheating & subsequent fire*
- Loss Prevention recommendations:
 - *Designing of Current Transformer (CT) & the rating of may be re-checked*

Major Fire Loss 9

- Brief Description of plant: *3 x 200 MW + 2x 500 MW Thermal Power Plant, West Bengal*
- Location of fire: *SF6 Breaker, located in outdoor switchyard*
- Date, time of loss: *10/12/1997, 23.40 hrs*
- Estimated loss: *Rs. 50 lakhs*
- Probable Cause of fire: *Possibly the short time contact relay failed and caused over heating of SF6 and produced SF6 gas under pressure, which might have ruptured the breaker*
- Loss Prevention recommendations:
 - *Periodic inspection of all protective devices is recommended*
 - *Periodic inspection of contact alignment and adjustment is recommended*
 - *Maintenance of circuit breakers should be done as per manufacturing guidelines*
 - *Install SF6 under pressure alarm*

Major Fire Loss 10

- Brief Description of plant: *7x 210 MW Thermal Power Plant, Tamil Nadu*
- Location of fire: *Boiler House*
- Date, time of loss: *03/10/1997, 21.30 hrs*
- Estimated loss: *Rs. 80 lakhs*
- Probable Cause of fire: *Leaking oil from burner ignited by hot surface*
- Loss Prevention recommendations:
 - *Preventive maintenance of oil guns to include periodical replacement of copper gaskets*
 - *Supervision by plant personnel during oil burner light up*

Major Fire Loss 11

- Brief Description of plant: *4 x 210 MW + 3 x 500 MW Thermal Power Plant, Maharashtra*
- Location of fire: *Coal Crusher House, Coal Handling Plant*
- Date, time of loss: *28/12/1997, 05.30 hrs*
- Estimated loss: *More than Rs. 50 lakhs*
- Probable Cause of fire: *Malfunctioning of electrical equipment above conveyor, igniting belt material*
- Loss Prevention recommendations:
 - *Good operation & maintenance procedures suggested*
 - *Spillage of coal quantity alongside the conveyor to be kept at minimum by periodic cleaning*
 - *Installation of dust-proof electrical fittings*
 - *Installation of LHSC along conveyor line*
 - *Use of anti-static conveyor belts*

Major Fire Loss 12

- Brief Description of plant: *4 x 210 MW Thermal Power Plant, Karnataka*
- Location of fire: *Ware House*
- Date, time of loss: *03/03/1997*
- Estimated loss: *Rs. 50 lakhs*
- Probable Cause of fire: *Either failure of thermal relay of air conditioner or defective wiring, igniting rubber goods stored below the air conditioner*
- Loss Prevention recommendations:
 - *Rubber items may be stored in closed racks*
 - *Combustible false ceiling of warehouse to be replaced by non-combustible type*
 - *Electrical wiring to be as per IS 732*
 - *Smoke detection & alarm system to be installed*
 - *Water type fire extinguishers may be installed along with Carbon Dioxide and Dry Chemical Powder type extinguishers*

Major Fire Loss 13

- Brief Description of plant: *4 x 60 MW Thermal Power Plant, Andhra Pradesh*
- Location of fire: *Bucket elevator of Air Heater Hopper*
- Date, time of loss: *14/07/1997, 18.05 hrs*
- Estimated loss: *Rs. 65 lakhs*
- Probable Cause of fire: *Oil coating on plates during boiler start up ignited and fanned by the fresh combustible air stream*
- Loss Prevention recommendations:
 - *Cleaning of air heater hopper by high pressure water to remove deposits, at regular intervals*
 - *Installation of LHSC within the layers of tubes or plates of air heaters*

Major Fire Loss 14

- Brief Description of plant: *7x 210 MW Thermal Power Plant, Tamil Nadu*
- Location of fire: *Current transformer installed in 230 KV, Switchyard*
- Date, time of loss: *15/09/1997, 18.02 hrs*
- Estimated loss: *Rs. 22.5 lakhs*
- Probable Cause of fire: *Failure of paper insulation of R- Phase, due to ageing or overheating*
- Loss Prevention recommendations:
 - *Inspection of CTs to be carried out as per IS 1002- 1981, part III*
 - *Designing of Current Transformer (CT) & the rating of may be re-checked*

Major Fire Loss 15

- Brief Description of plant: *6x 50 MW + 3 x 100 MW Thermal Power Plant, Tamil Nadu*
- Location of fire: *Turbo-Generator Set*
- Date, time of loss: *28/05/1998, 19 hrs & 22.05 hrs*
- Estimated loss: *Rs. 300 lakhs*
- Probable Cause of fire: *Spillage of lubricating oil ignited in contact with hot surface*
- Loss Prevention recommendations:
 - *Segregate pulverizer section from TG hall, to prevent deposition of pulverized Lignite powder on hot oil & steam lines*
 - *Have a good maintenance system for pipeline insulation in place*
 - *Install & maintain fire water system as per TAC regulations*
 - *Water spray protection system for atleast 20 feet beyond lubrication oil system and oil collection areas suggested*

Major Fire Loss 16

- Brief Description of plant: *2 x 75 MW + 1 x 4 MW Thermal Power Plant, Rajasthan*
- Location of fire: *Coal Stack in Coal yard*
- Date, time of loss: *03/06/1998*
- Estimated loss: *Rs. 100 lakhs*
- Probable Cause of fire: *Spontaneous ignition of coal*
- Loss Prevention recommendations:
 - *Keep entire coal storage free from vegetation*
 - *Coal stack temperature monitoring*
 - *Application of standard chemicals on coal heaps to reduce spontaneous ignition suggested*

Major Fire Loss 17

- Brief Description of plant: *6 x 210 MW Thermal Power Plant, Punjab*
- Location of fire: *250 MVA generator transformer*
- Date, time of loss: *29/04/1998, 20.20 hrs*
- Estimated loss: *More than Rs. 50 lakhs*
- Probable Cause of fire: *May be due to an internal fault. Exact cause could not be ascertained.*
- Loss Prevention recommendations:
 - *Preventive maintenance as per IS 10028- Part III recommended*
 - *Online Dissolved Gas Analyser*
 - *Fixed fire protection system (Mulsifier / Nitrogen Injection)*
 - *Linear Heat Detection Cable for heat detection*

Major Fire Loss 18

- Brief Description of plant: *4 x 60 MW Thermal Power Plant, Andra Pradesh*
- Location of fire: *65 MVA Generator Transformer*
- Date, time of loss: *21/08/1998, 06.00 hrs*
- Estimated loss: *Rs. 70 lakhs*
- Probable Cause of fire: *Possibly due to internal fault from insulation failure. Exact cause could not be ascertained.*
- Loss Prevention recommendations:
 - *Preventive maintenance as per IS 10028- Part III recommended*
 - *Online Dissolved Gas Analyser*
 - *Fixed fire protection system (Mulsifier / Nitrogen Injection)*
 - *Linear Heat Detection Cable for heat detection*

Major Fire Loss 19

- Brief Description of plant: *2 x 210 MW Thermal Power Plant, Karnataka*
- Location of fire: *250 MVA Generator Transformer*
- Date, time of loss: *10/03/2002*
- Estimated loss: *Rs. 650 lakhs*
- Probable Cause of fire: *Either fault at the interconnection of LV duct and transformer or fault at transformer bushing or due to internal fault*
- Loss Prevention recommendations:
 - Preventive maintenance as per IS 10028- Part III recommended
 - Online Dissolved Gas Analyser
 - Fixed fire protection system (Mulsifier / Nitrogen Injection)
 - Linear Heat Detection Cable for heat detection
 - Annual tests of earth pits
 - Thermal imaging
 - Annual testing of protective relays

Major Fire Loss 20

- Brief Description of plant: **6 x 20 MW Thermal Power Plant, Karnataka**
- Location of fire: **Generator transformer**
- Date, time of loss: **18/06/2001, 01.47 hrs**
- Estimated loss: **More than Rs. 50 lakhs**
- Probable Cause of fire: **Either fault at the interconnection of LV duct and transformer bushing or failure occurring in transformer bushing**
- Loss Prevention recommendations:
 - Preventive maintenance as per IS 10028- Part III recommended
 - Online Dissolved Gas Analyser
 - Fixed fire protection system (Mulsifier / Nitrogen Injection)
 - Linear Heat Detection Cable for heat detection
 - Annual tests of earth pits
 - Thermal imaging
 - Annual testing of protective relays

Major Fire Loss 21

- Brief Description of plant: *2 x 60 MW + 3 x 110 MW Thermal Power Plant, Madhya Pradesh*
- Location of fire: *High Pressure lube oil system in turbine building*
- Date, time of loss: *10/10/1988*
- Estimated loss: *Rs. 500 lakhs*
- Probable Cause of fire: *Either fault at the interconnection of LV duct and transformer bushing or failure occurring in transformer bushing*
- Loss Prevention recommendations:
 - Lube oil system to be periodically checked including all safety interlocks / trips, flange gaskets, etc.
 - Water spray system for lube oil system to be extended for all elevations of turbine floors
 - High pressure oil lines may be housed inside return piping to avoid fire hazards due to lube oil leak

Major Fire Loss 22

- Brief Description of plant: *2 x 30 MW + 1 x 125 MW + 1 x 20 MW + 1 x 25 MW + 5 x 6 MW DG sets Captive Power Plant, Jharkhand*
- Location of fire: *Steam Turbine Generator*
- Date, time of loss: *11/03/2002*
- Estimated loss: *Rs. 1400 lakhs*
- Probable Cause of fire: *Either failure of insulation between windings, causing short circuit in generator winding or short circuit in electrical cables located in underground floor, spread to generator*
- Loss Prevention recommendations:
 - *Risk-based Preventive maintenance to be adopted*
 - *Power and control cables to be installed as per IS 12459-1988*
 - *Power cables to be applied with fire retardant coating*
 - *Adopting passive fire protection for all areas where there is possibility of fire spread*
 - *Installation of LHSC for cable tray enclosure. ~~Interlocked with medium velocity water spray system~~*

Major Fire Loss 23

- Brief Description of plant: *7x 210 MW Thermal Power Plant, Tamil Nadu*
- Location of fire: *Conveyor feeding boiler*
- Date, time of loss: *04/09/2002, 16.45 hrs*
- Estimated loss: *Rs. 100 lakhs*
- Probable Cause of fire: *malfunctioning of electrical equipment, igniting the conveyor belt*
- Loss Prevention recommendations:
 - *Standard O&M procedures to be adopted*
 - *Installation of fire retardant & anti-static conveyor belts*
 - *Spillage of Lignite from conveyor to be removed periodically to avoid fire risk*
 - *Good housekeeping near conveyor to be practiced*

Major Fire Loss 24

- Brief Description of plant: *60 MW DG sets, Captive Power Plant, Gujarat*
- Location of fire: *Generator*
- Date, time of loss: *02/03/2001, 10.00 hrs*
- Estimated loss: *Rs. 750 lakhs*
- Probable Cause of fire: *leakage of lube oil pipeline, spreading high pressure oil, ignited by hot surfaces*
- Loss Prevention recommendations:
 - *Wall / floor openings for cable passes to be sealed*
 - *Fire retardant coating to be applied for all power cables*
 - *Oil gaskets in lube oil pipelines to be replaced periodically to avoid leakages*
 - *Insulation of lube oil pipelines must be ensured for intactness*
 - *Install baffle plates at hot surfaces*

Major Fire Loss 25

- Brief Description of plant: *1 x 180 MW Combined Power Plant, Mumbai*
- Location of fire: *Fire Gas De-Supherizer*
- Date, time of loss: *11/02/2002, 09.32 hrs*
- Estimated loss: *Rs. 500 lakhs*
- Probable Cause of fire: *Flying sparks from gas cutting, igniting Polypropylene packing material in the desulpherisation tower*
- Loss Prevention recommendations:
 - *Temperature detectors (to be calibrated periodically) at flue gas desulpherizer duct*
 - *Isolate area of hot work from combustibles*
 - *Employee training and adhering to hot work permit recommended*

25 Major Losses- Analysis

- Losses more than 1 Crore and above – 40 %
- **Generator Transformer- 20 %**
- **Coal Handling Plant – 20 %**
- **Lube Oil Area – 24 %**

Thank you!

Source: LPA Major fire loss database, *losses more than 50 lakhs*