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CAR LOSS

CHIMNEY COLLAPSE

India 2009

BRIEF INFORMATION

Type of Risk	:	Power Plant construction
Type of Loss	:	Collapse
Type of Cover	:	CAR
Estimated Loss	:	Not available.
Description of Loss	:	Collapse of chimney under construction
Probable Cause of Loss	:	Technical fault in construction

TECHNICAL INFORMATION OF CHIMNEY

Total Chimney Height → ~ 200 Mtr
Diameter → ~ 14 Mtr
(at ground level)

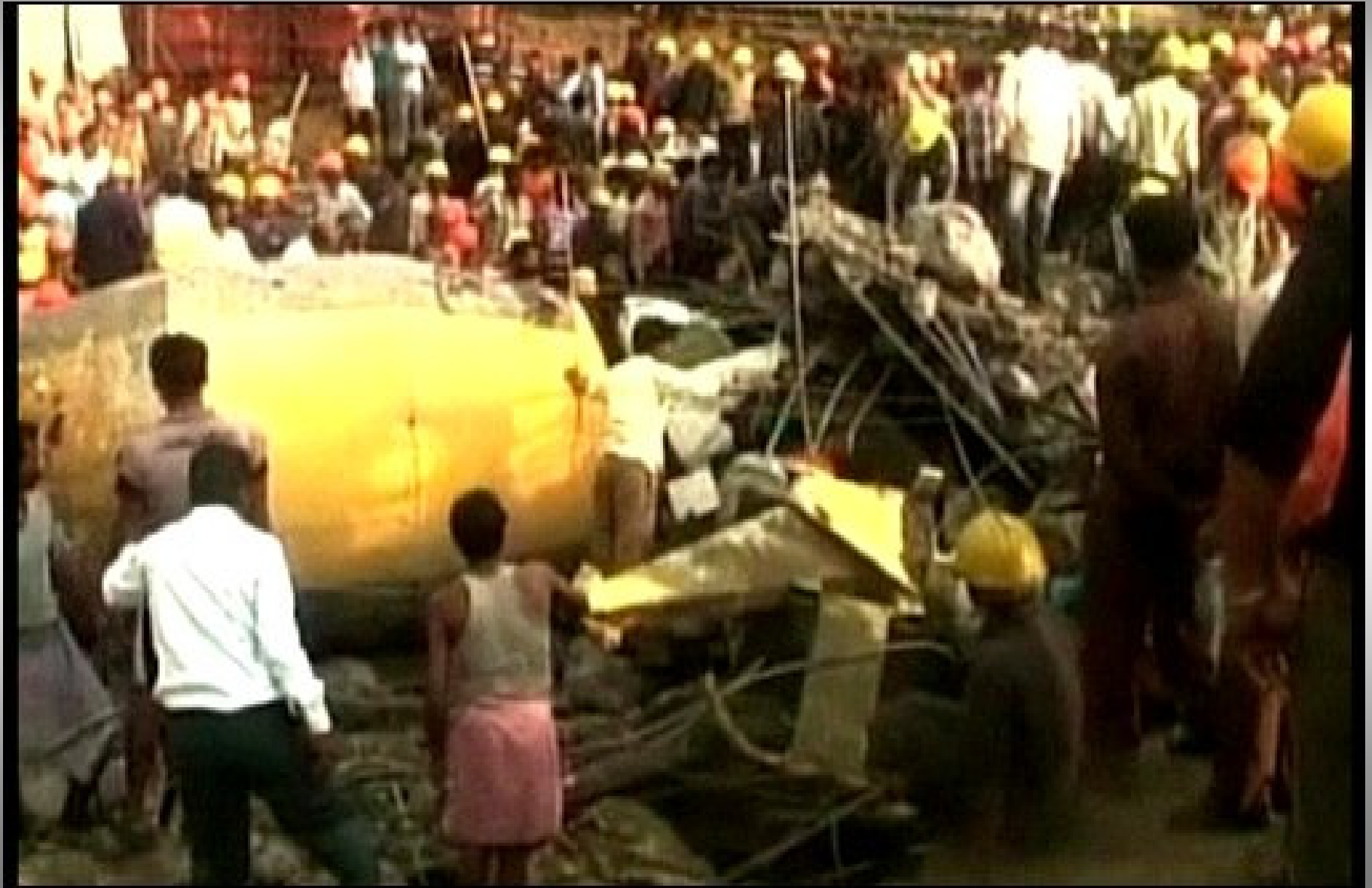
Point of failure → 174 Mtr
Diameter at
failure point → ~ 9 Mtr



INCIDENCE

- 3.45 pm Heavy thunderstorm with rain in that area.
- 3.50 pm Collapse of chimney. It was a straight collapse like WTC tower (9/11).
- 4:10 pm Rains stopped.
- 4:30 pm Rescue team rushed to spot. Initial casualties identified and rushed to hospital.
- Next 48 hrs Rescue operation continued.

COLLAPSED CHIMNEY STRUCTURE



RESCUE WORK IN PROGRESS



CONCRETE DEBRIS



DEBRIS REMOVAL

**Equipments
in rescue operation**



DEBRIS REMOVAL.....CONT...



DEBRIS REMOVAL.....CONT...



CAUSE OF LOSS - (As per media)

- Thunder storm effect on Chimney
- Apprehensions in quality of concrete used.
- Rapid slip form to beyond the accepted slipping norms [main cause].
- 3.5 – 4 mtr/day Slipping done against the accepted 2.4 mtr/day (100mm/hr).
- Center of Gravity (C.G.) of chimney might have been disturbed.

EXTENT OF DAMAGE

- Collapse of under construction chimney.
- Cafeteria adjacent to chimney got crushed under debris.
- More than 50 workers died under collapsed structure.
- Investigations are continuing

LESSONS LEARNT

- The height of an existing chimney should be increased only after expert Consultation, since extra height can affect the stability of a chimney's shaft and foundation.
- A chimney specialist also should be consulted before adding new gas load, or raising or lowering the temperature of gas flowing to a chimney.
- In order to prevent chimney cracking, addition of extra weight by erection of a structure near a chimney shaft foundation should be avoided, unless specially evaluated.
- Avoid violation of standard construction norms during construction.

RECOMMENDATIONS

- Reinforced Concrete Chimneys –
 - The chimney shell should be designed and constructed in accordance with methods described in the latest edition of ACI No. 307 Standard.
 - This standard includes design and construction guidelines for the following items: materials of construction, wind forces, earthquake design, vertical temperature stresses, circumferential temperature stresses, combined stresses due to dead load, temperature, and wind, metal reinforcement, etc.