

Sikkim Tunnel Disaster: Methane Blast Highlights Himalayan Infrastructure Risk

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Sikkim Tunnel Disaster Latest News

- Recently, a **methane gas explosion** inside the under-construction Head Race Tunnel (HRT) of NHPC's 500 MW **Teesta Stage VI** Hydropower Project in Samardung, Namchi district, Sikkim, killed 25 workers.
- The disaster has renewed scrutiny of hydropower infrastructure safety, project management, and the ecological fragility of the Himalayan region.

What Happened

- A sudden release of methane trapped in rocks near Tunnel 4B triggered an explosion, giving workers little time to escape.
- Nineteen employees of Patel Engineering Ltd and six personnel of PRW Manpower were inside the tunnel at the time; all 25 were killed.

- Five workers remained trapped roughly 1.5 km inside the tunnel for over 24 hours before rescue operations concluded.

Why the Explosion Occurred

- **Preliminary cause:** Sudden explosive release of methane trapped or embedded in rock, likely ignited by drilling sparks.
- **How methane accumulates in hills:** It occurs as natural gas in porous rock or localised pockets in young, fragile geological formations — common in the Himalayan belt with historical coal-bearing strata. Oxygen-deprived, waterlogged hilly depressions and decomposing organic matter also generate methane.
- **Sikkim-specific geology:** Though Sikkim has **no coalfields**, it lies in the **Rangit Tectonic Window zone**. Geological Survey of India studies found around 1.40 lakh tonnes of coal reserves in southern Sikkim, mainly in Namchi — the disaster site. A regional coal exploration project began there in December 2025.
- **Detection challenge:** Methane is colourless and odourless. NHPC officials noted that standard tunnel surveys (topographical, geotechnical, geophysical, hydrological, resistivity, utility tests) cannot detect it.

Warning Signs Ignored

- A 2025 paper by five NHPC engineers, presented at an international geology conference in Croatia, documented repeated encounters with flammable gas, unstable rock, cavities, and heavy groundwater inflows during excavation.
- Flammable gas was first encountered in November 2009 under original developer Lanco Teesta Hydro Power Ltd, causing a tunnel fire.
- After NHPC revived the project, methane was again detected seeping through an excavation face, with concentrations reaching nearly one-third of the lower explosive limit.
- Workers alleged prior gas-related fires (six-seven months earlier) injured labourers, but no corrective action was taken; those who raised safety concerns faced job threats.
- Workers also alleged safety equipment (helmets, safety shoes) was provided only during official inspections, and basic medical facilities like bandages were unavailable inside the tunnel.

Ecological and Regional Concerns

- Environmental groups have long warned that extensive tunnelling and blasting across the Teesta basin could destabilise slopes and increase vulnerability to earthquakes and Glacial Lake Outburst Floods (GLOFs).
- The October 2023 **South Lhonak GLOF** devastated the Teesta valley, destroying the Teesta III dam — reviving concerns about hydropower expansion in the basin.
- These groups have demanded fresh Environmental Impact Assessments for existing and proposed Teesta basin projects, arguing conditions have changed significantly since the GLOF.
- Activists argue the tunnel blast is proof of long-ignored concerns that hydropower tunnels and reservoirs can generate methane, a climate concern beyond just safety.

Pattern of Himalayan Tunnel Disasters

- Tunnelling risk is not isolated to Teesta VI. Notable prior incidents include:
 - Parbati-II Project, Himachal Pradesh (May 2021) — tunnel collapse killed 4 labourers
 - Subansiri Lower Hydroelectric Project, Arunachal-Assam border (June 2022, July 2024) — tunnel roof collapses killed workers
 - Khooni Nallah tunnel, Jammu-Srinagar highway (May 2022) — 10 killed
 - Silkyara Bend-Barkot tunnel, Uttarakhand (November 2023) — 41 workers rescued after cave-in
 - Srisailem Left Bank Canal tunnel (February 2025) — collapse trapped 8 engineers/labourers
 - Tupul Railway Station, Manipur (June 2022) — landslide killed 61, India's worst such disaster
 - Dhauliganga Hydroelectric Project, Uttarakhand (August 2025) — landslide; all 19 trapped NHPC employees rescued

Conclusion

- The Teesta Stage VI tragedy is a grim convergence of fragile Himalayan geology, chronic project mismanagement, and disregarded worker safety warnings.
- It underscores the urgent need for updated environmental assessments, robust methane-detection protocols, and enforceable safety accountability before India expands infrastructure further into its most seismically and ecologically sensitive terrain.

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