

THE SPARK THAT DID NOT COME

PROPYLENE, PETROL, DIESEL AND A CERTIFIED BLACK SPOT — WHY INDIA'S CHEMICAL TRANSPORT SAFETY FRAMEWORK MUST MOVE BEYOND SILOS



RAJENDRA UTTURKAR

At approximately 5:00 PM on Tuesday, 3 February 2026, a BPCL propylene tanker — registration NL01 AG 4250, carrying 21 tonnes of highly flammable gas — lost control on a sharp curve near the Adoshi Tunnel on the Mumbai-Pune Expressway and overturned. The driver, Ratan Singh, aged 44, sustained injuries. The tanker did not explode.^[1]

For the next 21 hours, specialist teams worked to transfer the propylene load into three replacement tankers. For over 30 hours, one of India's most critical freight and passenger corridors became a parking lot — a traffic gridlock stretching 10 to 25 kilometres, trapping an estimated 1.25 lakh commuters, halting commercial supply chains, and exposing thousands of petrol and diesel vehicles to a slow, invisible, colourless cloud of flammable gas.^[1]

No ignition occurred. No explosion. No mass casualty.



***We Were Not Safe. We Were Lucky.
Those Are Not The Same Thing.***



This article does not question the competence of the emergency responders who worked through the night. Their professionalism saved lives. This article questions something far more fundamental: why the conditions for a catastrophe were allowed to exist in the first place — and why no single framework in India is designed to prevent them.

THREE KNOWN FACTORS. ALL ON OFFICIAL RECORD.

Process safety professionals understand a foundational principle: an accident that was predictable is not an accident. It is a managed failure awaiting its moment. The Adoshi incident was not unpredictable. Three factors — each independently documented, each publicly known — converged at a single location on a single afternoon.

Factor One: A Certified Accident Black Spot. The Bhor Ghat section of the Mumbai-Pune Expressway is an officially declared road accident black spot under the Ministry of Road Transport and Highways (MoRTH) protocol. Under this protocol, a stretch of approximately 500 metres qualifies as a black spot when five or more accidents involving fatalities or grievous injuries — or ten or more fatalities — occur within three calendar years.^[2] The Adoshi Tunnel approach, with its sharp curve and steep descending gradient, met this threshold. The location was known. The hazard was documented.

Factor Two: Liquid Surge Physics. Any tanker carrying a liquid or liquefied gas load is subject to surge forces — the dynamic shifting of mass within the vessel during acceleration, braking and cornering. On a steep downhill gradient combined with a sharp curve, these forces are amplified significantly. This is not contested science. A 21-tonne propylene load in a semi-trailer navigating the Bhor Ghat curve at speed was a textbook surge scenario. The physics was known.

Factor Three: Propylene. Propylene (UN 1077) is classified as a Class 2.1 Flammable Gas.^[10] It is colourless and largely odourless. Its boiling point is -47.6°C , which means it vaporises instantly on release at ambient temperature. Critically, it is heavier than air — it does not dissipate upward but hugs the ground, spreading laterally and pooling in low-lying areas. Its flammability range in air is 2.4% to 10.3% by volume. In the presence of any ignition source — a spark from a vehicle engine, a cigarette, a mobile phone — the consequences would be immediate and catastrophic. These properties were known.

Three known factors. One location. One afternoon. The question that no official investigation has yet asked is not what caused this incident, but why these three known factors were permitted to coexist without a coordinated prevention framework.

THE EXTENT OF OUR GOOD FORTUNE

To understand what was at stake, consider the geography of the incident. The Bhor Ghat section of the Mumbai-Pune Expressway — India's first access-controlled highway, inaugurated in 2002 — carries an estimated 50,000 to 60,000 vehicles daily.^[12] During the 30-plus hour gridlock that followed the overturn, thousands of those vehicles —

cars, buses, trucks, heavy vehicles carrying their own fuel loads — were stationary or slow-moving within metres of a propylene tanker whose structural integrity had been compromised.

Propylene leaked gradually for 21 hours as specialist teams executed a controlled gas transfer. The gas, being heavier than air, settled low across the carriageway. The expressway became, in effect, a confined atmosphere — not enclosed by walls, but bounded by the geography of the ghat and the density of stationary traffic. Any ignition event during those 21 hours would not have produced a localised fire. It would have produced a conflagration.

The Emergency Response Was Professional And Effective. The Absence Of A Spark Was Providential. Neither Should Be Confused With Safety.

To their credit, the emergency teams — NDRF personnel, Khopoli Fire Brigade, BPCL and ONGC chemical experts, IRB Highway Police — executed the gas transfer with skill and discipline. Fire brigade teams continuously sprayed water throughout the 21-hour operation to suppress temperature and eliminate ignition risk. Traffic was halted on both carriageways. Evacuation protocols, however improvised, were implemented. The tanker did not explode. These outcomes deserve acknowledgement.

But the 21-hour transfer window, the 30-plus hour gridlock, the absence of pre-positioned emergency equipment, the crane that arrived late because it was caught in the same traffic it had been dispatched to clear — these are not evidence of a system that worked. They are evidence of a system that survived. In direct response to this incident, MSRDC has since announced plans for wider median openings every 2.5 kilometres along the ghat section and dedicated on-site hazmat personnel — a belated acknowledgement of the gap that existed.^[13]

THE RECTIFICATION MANDATE AND ITS LIMITS

The MoRTH black spot rectification protocol, established by Office Memorandum dated 28 October 2015 and updated in November 2020, is a genuinely important framework.^{[2][3]} Upon identification of a black spot, it mandates immediate cautionary measures — warning signs, speed restrictions, rumble strips — pending permanent rectification, which must be completed within six months of sanction. NHAI Project Directors have delegated powers of up to 25 lakh per spot for short-term measures. MoRTH Regional Officers hold technical approval authority for permanent works.^[4]

The permanent measures contemplated by this protocol are road engineering interventions: curve realignment, lane widening, crash barrier installation, sight-line improvements, and similar geometric corrections. These are appropriate and necessary responses to a documented black spot. They address the road.

They do not address the cargo.

The MoRTH black spot protocol has no mechanism to ask: what is the consequence profile of this specific location when the vehicle involved is carrying a Class 2.1 Flammable Gas? What emergency response capability must exist within a defined radius of this spot before a propylene tanker is permitted to transit it? What special conditions — reduced speed, escort requirement, time-of-day restriction, pre-notification to emergency services — apply to hazardous cargo vehicles at this location?

These questions are outside the protocol's scope entirely. And therein lies the first gap.

THE UMBRELLA ORGANISATION THAT DOES NOT EXIST

India's hazardous cargo transport regulatory framework is, in principle, comprehensive. The Central Motor Vehicles Rules, 1989 (CMVR) govern driver qualification — including the mandatory Rule 9 endorsement requiring a three-day certified training course for all hazardous goods vehicle drivers, recently reaffirmed as a statutory obligation by the Supreme Court of India in April 2025.^{[5][6]} The Static and Mobile Pressure Vessels (Unfired) Rules, 2016 (SMPV Rules), administered by the Petroleum and Explosives Safety Organisation (PESO), govern the design, fabrication, inspection and certification of every mobile pressure vessel above 1,000 litres capacity.^[7] The BIS standard IS 18149:2023 provides comprehensive guidelines for the transportation of dangerous goods.^[8] The Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989 govern the broader chemical safety framework.^[9]

Each of these instruments is administered by a different authority. CMVR is administered by MoRTH. SMPV Rules by PESO under the Department for Promotion of Industry and Internal Trade. BIS standards by the Bureau of Indian Standards. Chemical safety rules by the Ministry of Environment, Forest and Climate Change. MoRTH black spot protocols are implemented by NHAI and state road bodies such as MSRDC in Maharashtra.

The result is a landscape of well-intentioned, independently functional regulatory silos. Each certifies its specific domain. None is responsible for the intersection.

CMVR Certified The Driver. PESO Certified The Vessel. MoRTH Certified The Black Spot. Nobody Certified The Combination.

For the purposes of this analysis, the complete set of organisations that must act in coordination for every tonne of hazardous cargo to move safely across this corridor may be termed the Umbrella Organisation. It comprises: State Government (Chief Minister level emergency authority); Regulators (PESO, MoRTH, CMVR); Law Enforcement (Highway Traffic Police and Local Police); Disaster Response Bodies (NDRF, specialist chemical response teams, the transporting company); and Road Infrastructure Bodies (NHAI and MSRDC). Collectively, all five categories of this Umbrella Organisation had a presence, a mandate, or a responsibility relevant to the Adoshi incident.

Not one of them was required, by any existing regulation, to ask the combined-risk question: what is the consequence of a propylene tanker overturning at this certified black spot, and are we prepared?

WHAT THE INTERNATIONAL STANDARD DEMANDS

The contrast with international practice is instructive. Under the Agreement Concerning the International Carriage of Dangerous Goods by Road (ADR), administered by the United Nations Economic Commission for Europe (UNECE), tunnels and mountain passes are assigned Tunnel Restriction Codes – categories A through E – that determine which classes of dangerous goods may transit which infrastructure under what conditions.^[1] Category A imposes no restriction; Category E, the most restrictive, prohibits virtually all hazardous substances. Under ADR Table A (Column 15), propylene (UN 1077) carries restriction code (B/D) – meaning code (B) when transported in packages, and code (D) when transported in a tanker. As a tanker, the operative code is (D): transit through Category A, B, and C tunnels is permitted, but transit through Category D and E tunnels is prohibited without specific arrangements. Route planning, including tunnel code compliance, is a mandatory component of the transport documentation. The consignor, the carrier and the driver each carry defined obligations for route selection.

India has no equivalent framework. The Adoshi Tunnel – on a certified black spot ghat section, with a documented history of accidents, on a gradient that amplifies liquid surge forces – carried no tunnel category, no hazardous cargo restriction, no mandatory pre-notification to emergency services, and no requirement for a pre-approved emergency response protocol specific to flammable gas incidents at that location.

This is not a criticism of any individual agency. It is an observation about the architecture of the system. The Umbrella Organisation's components each function. The Umbrella Organisation itself – as a coordinated, synchronised entity capable of owning combined risk – does not yet exist in Indian regulation.

THE FRAMEWORK INDIA NOW NEEDS

The Adoshi incident of February 2026 is a defining case study. It is not the last of its kind. India's chemical industry continues to grow. Its road transport network carries an ever-increasing proportion of hazardous cargo. The Mumbai-Pune corridor alone handles significant volumes of petrochemical freight between the refineries and petrochemical complexes of the western coast and the industrial heartland of Maharashtra and beyond.

The framework change required is not complex in concept, though it demands genuine inter-agency coordination to implement. Three elements are essential.

First, a Hazardous Cargo Route Risk Classification.

Every declared black spot on a National Highway and State Expressway must be assessed for its consequence profile in the event of a hazardous cargo incident – not merely for its general accident history. Where flammable, toxic or explosive cargo transits a high-risk geometry, the classification must trigger specific operational requirements: mandatory pre-notification to emergency services, pre-positioned response equipment, defined speed restrictions by cargo class, and – where the risk profile warrants it – time-of-day or weather-based restrictions on hazardous cargo movement.

Second, a Synchronised Umbrella Organisation Protocol. For every designated high-risk corridor segment, a formal, documented, tested coordination protocol must exist among all members of the Umbrella Organisation. This is not a request for a new bureaucracy. It is a request that existing agencies – PESO, MoRTH, NHAI, NDRF, State Police, State Government – agree in advance, document in a shared protocol, and test through joint exercises, precisely what each will do in the first 30 minutes, the first three hours, and the first 24 hours of a hazardous cargo incident at each designated location.

Third, Post-Incident Learning with Legal Force. The Adoshi incident will generate official reports. Those reports will examine driver conduct, vehicle condition, and road geometry. If the analysis presented in this article is correct, they will not examine the combined-risk gap – because no regulation currently requires them to do so. India needs a statutory post-incident learning mechanism for hazardous cargo transport incidents – analogous to the Aircraft Accident Investigation Bureau for aviation – whose mandate explicitly includes systemic and inter-agency failures, not merely proximate technical causes.

CONCLUSION: THE UMBRELLA MUST HAVE A CENTRE

On the evening of 3 February 2026, 21 tonnes of propylene leaked slowly into the atmosphere above a gridlocked expressway. Thousands of petrol and diesel vehicles sat within metres of an invisible, ground-hugging flammable cloud. For 21 hours, the safety of an estimated 1.25 lakh people depended not on any system, protocol or regulation – but on the absence of a single spark.

The spark did not come. We should be grateful. We should not be satisfied.

India's chemical industry understands, better than most, that luck is not a process safety strategy. Every plant manager reading this article has a risk register, a process hazard analysis, a layer of protection analysis. Every one of them knows that the question is never whether a hazardous event is possible – but whether the consequence of that event, should it occur, has been bounded by deliberate design.

The Adoshi incident reveals that India's hazardous cargo transport system has not yet applied this principle to the intersection of dangerous cargo and dangerous

terrain. The individual components of the Umbrella Organisation are capable and committed. What is missing is the umbrella itself – a coordinated, synchronised, legally mandated framework that sees the combined risk, owns the combined risk, and prepares for the combined risk.

The Spark That Did Not Come Will Not Always Be Absent. The Framework That Did Not Exist Must Not Always Be Missing.

That is the lesson of Adoshi 2026. And it is a lesson the chemical industry – which has always led India's safety thinking – is uniquely positioned to demand.

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ABOUT THE AUTHOR:

Rajendra Utturkar is the Founder of SEPLO-ITR, a chemical industry process safety and profitability consulting firm. A chemical engineer and ICT Mumbai alumnus with over 40 years of industry experience. He is the author of *Earn or Burn Your Profits* (2024) and the developer of the SEPLO Process – a framework for implementing 4th Era of process safety management system.