Atmanirbhar Bharat in Defence for Ending Import Dependence: DRDO's Indigenous 8x8 CBRN Vehicle Sets New Standard

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Summary

This article focuses on India's push for self-reliance in defence through the development of DRDO's indigenous 8x8 CBRN Reconnaissance Vehicle. It highlights the persistent global CBRN threat, India's past import dependence, and the vehicle's advanced capabilities, underscoring how collaborative innovation under Atmanirbhar Bharat strengthens national preparedness and defence autonomy.

Introduction

The primary purpose of a modern Chemical, Biological, Radiological, and Nuclear (CBRN) Reconnaissance Vehicle is to provide battlefield commanders and civil authorities with early warning. These units are designed to move into a potentially contaminated area, detect hazardous agents, identify them, mark the contaminated zone, and transmit this data in real-time, all while keeping the crew protected. This need is not new; it was born in the trenches of World War I. The large-scale use of chemical weapons, beginning with the German chlorine gas attack at Ypres in 1915, introduced a new dimension of horror to warfare[1]. The widespread deployment of choking agents like phosgene and blistering agents like mustard gas caused over a million casualties and demonstrated the critical need for detection, protection, and specialised reconnaissance.[2]

International Conventions and their limits

The horrific use of gas in WWI led the world to seek international bans on these weapons. This resulted in several key treaties:

- **The 1925 Geneva Protocol:** Banned the *use* of chemical and biological weapons in warfare.[3]
- **The 1972 Biological Toxin Weapons Convention (BTWC):** Prohibits the *development, production, and stockpiling* of biological weapons.[4]
- **The 1993 Chemical Weapons Convention (CWC):** A more comprehensive treaty that outlaws the *development, production, stockpiling, and use* of chemical weapons, mandating their destruction.[5]

However, despite the CWC and BTWC, the threat of these weapons has not been eliminated. The conventions are only as strong as their verification and enforcement, and both state and non-state actors have violated their prohibitions. This persistent threat means that preparedness is not optional. Recent instances of CBRN use have repeatedly demonstrated this grim reality:

- **The Iran-Iraq War (1980s):** Saw the widespread use of mustard gas and nerve agents (like Tabun) by Iraqi forces[6] against both Iranian troops and Kurdish civilians, most infamously in Halabja[7].

- **The Syrian Civil War (2013-2018):** Featured the repeated use of sarin and chlorine gas against civilian populations, including major attacks in Ghouta[8] and Khan Shaykhun[9].

- **State-Sponsored Assassinations:** High-profile cases, such as the assassination of Kim Jong-nam with the **VX nerve agent** in 2017 and the **Novichok** nerve agent poisoning in Salisbury, UK[10], in 2018, show a continued willingness to deploy these weapons[11].

For India, this global threat is compounded by a volatile neighbourhood, with two nuclear-armed neighbours (China and Pakistan) possessing advanced and undeclared programs.

India's past dependence

For decades, India's response capability to these threats was limited and heavily import-dependent. This created a critical vulnerability: a lack of a modern, high-speed vehicle that could keep pace with fast-moving armoured columns. The Indian Army's primary platform was the **BMP-2-based CBRN Recce Vehicle**. This was a modification of the ageing Soviet-era BMP-2 "Sarath" tracked infantry carrier, license-produced in India. While functional, it was an adaptation of an old chassis and lacked the mobility, on-board power, and integrated systems of a modern, purpose-built wheeled vehicle. This forced reliance on imported standalone detection systems and stopgap solutions.

The DRDO solution: a new indigenous standard

To fill this long-standing capability gap, India's Defence Research and Development Organisation (DRDO) has successfully developed and tested a new, indigenous 8x8 Wheeled CBRN Reconnaissance Vehicle. The vehicle, developed by the Vehicle Research and Development Establishment (VRDE), Ahmednagar, completed a comprehensive series of developmental and firing trials at the National Center for Automotive Testing (NCAT), Ahmednagar, and KK Ranges. The trials successfully validated all key systems: mobility, amphibious capability, automated area marking, remote sample collection, and the complete CBRN instrumentation suite.

Key Platform Specifications:

- **Platform:** A 2nd-generation 8x8 wheeled vehicle based on the "Family of Vehicles" philosophy (also used for the Wheeled Armoured Platform, or WhAP).

- **Power & Mobility:** An integrated 600 hp engine with automatic transmission, hydro-gas suspension, and a top speed of 101 km/hr. It is fully amphibious, using hydrojets to cross water obstacles.

- **Protection:** Features modular ballistic and blast protection (upgradable to STANAG-IV) and a "Crew-in-hull" design with an over-pressure NBC filtration system.

- **Armament:** A 7.62 mm Remote Controlled Weapon Station (RCWS).

Advanced CBRN Instrumentation Suite:

- **Chemical Detection: Automatic Chemical Agent Detection & Alarm (ACADA)** for point detection and a passive IR standoff detector for remote chemical cloud detection.
- **Biological Detection:** A UV-fluorescent type Biological Warfare Agent Detection System (BWADS).
- **Radiological/Nuclear Detection:** A **RADMAC** system to detect nuclear explosions and radiation fallout.
- **Sampling:** A **Remotely Operated Scooping Device** in the rear to collect contaminated soil and water samples without exposing the crew.

Comparative analysis shows the Indian platform has a definitive edge in power (600 hp) and mobility over contemporaries like the German Fuchs 2 (425 hp) and the non-amphibious US Stryker M1135 (350 hp).

Comparative Analysis Chart

Feature	Wheeled CBRN RV	Fuchs 2 NBC RS	Stryker M1135	Piranha 3 NBC Reccee
Configuration	8x8	6x6	8x8	8x8
Max Power (hp)	**600**	425	350	400
P/W Ratio (hp/t)	**27.90**	21.25	18.08	18.18
Max Speed (km/hr)	**101**	96	96.5	100
Amphibious	**Yes**	Yes	**No**	Yes
Sample Collection	**Remotely Operated Scooping Device**	Double wheel system	Double wheel system	Double wheel system

Ending Import Dependence & Filling Capability Gaps

This new DRDO vehicle fills several significant gaps in India's existing defence capabilities:

1. **Ending Import Dependence:** For decades, India relied on modifying Soviet-era BMP-2 tracked vehicles for the CBRN role or importing standalone detection systems. The new 8x8 platform is India's first purpose-built, indigenous solution, moving the country from a position of import dependence to self-sufficiency in this critical niche technology.

2. **Mobility for Mechanised Warfare:** The older BMP-2-based systems lacked the speed and mobility to keep pace with modern wheeled mechanised infantry and tank columns. This new 8x8 platform, with its 600 hp engine, high cross-country speed (101 km/hr), and amphibious capability, is designed to move as fast as the strike formations it supports.

3. **Crew Protection and Exposure:** Previous reconnaissance methods often required crew members to be exposed to hazardous environments to collect samples. This vehicle's "Crew-in-hull" design, combined with its **Remotely Operated Scooping Device** and **RCWS**, allows the crew to perform all detection, sampling, and self-defense tasks from within the vehicle's protected, over-pressurised cabin.

A collaborative 'Make in India' success

This vehicle is a landmark success for the *Atmanirbhar Bharat* initiative, demonstrating a collaborative effort between DRDO laboratories (CAIR, DRDE, etc.) and key industry partners:

- **M/s Mahindra Defence Systems Ltd.:** Vehicle Platform
- **M/s Bharat Electronics Ltd.:** CBRN Instrumentation and RCWS
- **M/s Tonbo Imaging India Pvt. Ltd.:** Crew Vision System

This indigenous equipment has been demonstrated in joint exercises with international partners, including the United States, validating its advanced design. Following the successful completion of all trials, the platform **has been accepted by Indian Army units** and is suitable for deployment by paramilitary forces

Conclusion

The successful development and acceptance of the indigenous 8x8 CBRN Reconnaissance Vehicle marks a significant milestone in India's **'Atmanirbhar Bharat' (Self-Reliant India)** journey in defence. This achievement is underpinned by strategic policies such as the Defence Research and Development Organisation's (DRDO) **Development cum Production Partner (DcPP) program**, which actively integrates private Indian firms early in the R&D cycle[12]. By fostering collaboration from the development stage, the DcPP policy ensures a **seamless transition to large-scale manufacturing**, significantly speeding up production and building crucial private sector expertise in complex military technologies.

Recent evidence of this maturing ecosystem includes the DRDO's Vehicle Research and Development Establishment (VRDE) **transferring technologies for nine critical defence systems**—including the CBRN Recce Vehicle, Mounted Gun System, and Tank Transporter Trailers—to ten industry partners such as Bharat Electronics, Bharat Forge[13], BEML, and Tata Advanced Systems. Further strengthening this collaborative network, VRDE also recently signed an **MoU with COEP Technological University, Pune**, ensuring a pipeline from academic innovation to practical application.

This shift away from import dependence is profound, enabling the Indian private sector to come of age and establish a global footprint. The recent **inauguration of an Indian defence factory in Morocco by the Raksha Mantri (Defence**

Minister)[14] to produce the Wheeled Armoured Platform (WhAP) clearly signals India's emergence as a developer and exporter of advanced defence technology. The deep collaboration between DRDO and private players such as Tata and Mahindra, actively encouraged by the Raksha Mantri and aligned with the Prime Minister's vision, underscores the successful realisation of a self-reliant and globally competitive Indian defence industry.

Endnotes:

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