CBRN

Emerging Threats & Challenges

Seminar Report

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DCOAS (Strat), DG CLAWS and Speakers


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EXECUTIVE SUMMARY

- The CBRN 2024 Seminar delved into the intricate facets of CBRN threats, illuminating the extensive efforts required in research, development, logistics, and technical support. A resounding insight emerged: the pressing need for a National CBRN Security Strategy. This strategy stands as a cornerstone, harmonising efforts across sectors to proactively mitigate risks posed by chemical, biological, radiological, and nuclear threats. By fostering collaboration and integrating resources, it not only fortifies preparedness but also enhances national resilience against these evolving perils.

- In the discourse on the Global Nuclear Landscape, the imperative of transparent communication and mutual comprehension of nuclear capabilities took centre stage. Highlighting the delicate balance required to uphold strategic stability, particularly in South Asia, the discussion underscored India's strategic reassessment amidst challenges from neighbouring nuclear powers. The call for clarity in nuclear doctrines emerged as a beacon to navigate the complexities and avert unintended escalations.

- The discussion on Bio-Security and Bio-Safety Risks unravelled the spectre of Neurowarfare, a looming threat manipulating brain function and cognition. Advocating for a coordinated response, it proposed the establishment of a National Biochemical Defence Agency to navigate the evolving landscape of biodefense. This discourse emphasised the indispensable role of government entities and the imperative for investment in research, technology, and partnerships to confront modern threats effectively.

- In tackling Chemical Warfare, the sobering realisation of non-state actors' potential deployment of chemical weapons catalysed a call for unwavering vigilance. Proposals for bolstering incident prevention and establishing a National CBRN Centre of Excellence echoed the collective resolve to confront these persistent threats through innovation and collaboration.

- The conversation on Capacity Building in New Age CBRN Threats underscored the imperative of enhancing capabilities across detection, protection, medical management, and decontamination. Balancing technological advancements with the need for stronger infrastructure and collaboration, it charted a roadmap towards effective defence against evolving hazards.

- The discussion on CBRN Disaster Management highlighted the multi-agency oversight in India, coordinated by the Ministry of Home Affairs. It emphasised the pivotal role of the National Disaster Response Force (NDRF) in conducting assessments, rescues, and decontamination operations. Additionally, there was a call for an umbrella organisation dedicated to CBRN issues, revisiting India's nuclear doctrine, promoting private sector involvement, and adjusting relevant treaties and conventions for better addressing contemporary challenges.

KEY TAKEAWAYS AND RECOMMENDATIONS

CBRN 2024 Seminar dealt with critical aspects of CBRN threats and shed light on the substantial efforts required in research and development, logistics, and technical support. Key insights include a National CBRN Security Strategy, Investment in Research and Technology, a need for an umbrella organisation dedicated to CBRN issues and recommendations for national readiness against CBRN threats.

GLOBAL NUCLEAR LANDSCAPE WITH FOCUS ON CHINA AND PAKISTAN WITH IMPLICATIONS FOR INDIA

- The global nuclear landscape underscores the dominance of Russia and the United States, with significant arsenals also held by China, France, UK, India, Pakistan, Israel, and North Korea.

- China's expanding nuclear arsenal signifies its evolving strategic deterrence capabilities, posing regional stability and security challenges.

- China faces challenges in balancing its nuclear and conventional capabilities amidst global risks and pressure for nuclear arms control.

- India faces challenges from nuclear capabilities of China and Pakistan especially tactical nuclear weapons held by Pakistan, necessitating modernization efforts and strategic reassessment.

- India must focus on modernising its nuclear arsenal, enhancing strategic capabilities, and prioritising international cooperation and disarmament initiatives.

- Clear communication and understanding of each other's nuclear capabilities are crucial for maintaining strategic stability and preventing unintended escalations.

- Discussions on AI in nuclear command underscore the need for transparency and clarity in nuclear policies to mitigate risks associated with emerging technologies.

- The debate over strategic ambiguity highlights the importance of clarity in nuclear doctrines for preventing misunderstandings and miscalculations. The debate is still on whether India should adopt a second strike or first or an ambiguous nuclear policy option.

BIO-SECURITY AND BIO-SAFETY RISKS AND THEIR MITIGATION

- Biological warfare presents significant challenges due to its unpredictable nature and the difficulty of attributing attacks, allowing for plausible deniability.
- Neurowarfare, involving manipulation of brain function and cognition, is emerging as a potential future threat, impacting military strategies and national security.
- Technological convergence blurs the line between biological and chemical weapons, necessitating adaptive defence strategies.
- Emerging technologies like synthetic biology and artificial intelligence have dual-use potential, including for bioweapons development.
- India can learn from global biodefense strategies and initiatives to develop its comprehensive biodefense strategy.
- A comprehensive biodefense strategy for India is necessary to protect against potential biological threats from both state and non-state actors.
- Adaptation of surveillance and defence strategies is crucial to incorporate technological advancements for early detection and response.
- Public-private partnerships are essential for enhancing biodefense capabilities by leveraging resources and expertise.
- Legislation, enforcement, and surveillance form the foundation of preparedness efforts against biological threats.
- Establishment of a National Biochemical Defence Agency is recommended to coordinate biodefense efforts across sectors.
- Government agencies like the Ministry of Defence and the National Security Council Secretariat are crucial in driving preparedness efforts.
- Investment in research, technology, and partnerships is necessary to address modern threats, including those posed by bioweapons, effectively.

CHEMICAL WARFARE: PERSISTENT AND REAL THREATS

- The versatility of chemical weapons allows for mass casualties or targeted assassinations.
- Emerging trends include the use of riot control chemicals and bio-regulators in warfare.
- Chemical weaponization involves deploying chemicals in various devices, including drones.
- Non-state actors may deploy chemical weapons, necessitating preparedness for crude methods like chemical dirty bombs.
- Incidents of chemical terrorism highlight the ongoing threat and the need for vigilance.
- The role of international organisations like the UN and WCO is crucial in addressing chemical threats.
- India's commitment to strategic trade control initiatives is essential for addressing chemical threats effectively.
- Development of a comprehensive National CBRN Security Strategy, including prevention, response, and policy development.
- Alignment of laws and regulations with international initiatives and conventions to enhance chemical industry standards.
- Enhance awareness among the public about CBRN threats and mitigation measures.
- Strengthening incident prevention, enforcement, and oversight mechanisms to stop chemical proliferation.
- Establish a National CBRN Centre of Excellence to develop policies, training, research, and collaboration with global institutions.

CAPACITY BUILDING FOR NEW AGE CBRN THREATS

- Capability building is essential for effectively responding to CBRN threats, focusing on detection, protection, medical management, decontamination, and training.

- Decontamination procedures are vital for neutralising the effects of hazardous agents and ensuring safe re-entry to affected areas.

- Significant progress has been made in developing detection technologies, but further research is needed, especially in the biological domain.

- Indigenously developed detection technologies for chemical threats are progressing, but keeping pace with evolving threats remains crucial.

- Personal protective equipment is crucial for defence against CBRN threats, with ongoing advancements aimed at improving comfort and effectiveness.

- Collective shelters and decontamination equipment play essential roles in mitigating contamination risks and providing safe havens.

- Medical management, including the development and deployment of medical countermeasures, is critical for saving lives in CBRN incidents.

- Strengthening infrastructure, capacity building, and fostering collaboration are essential for effective CBRN defence.

- Balancing cost-effectiveness and shelf life in procuring CBRN equipment is crucial, ensuring safety standards without compromising effectiveness.

CBRN DISASTER MANAGEMENT- NATIONAL PERSPECTIVE

- Real-world incidents like the Bhopal Gas Tragedy and the COVID-19 pandemic highlight the significant impact of CBRN emergencies on civilian life.

- Challenges in detecting and identifying CBRN threats underscore the importance of comprehensive preparedness measures, including coordination among stakeholders and effective medical countermeasures.

- Misinformation and inadequate infrastructure further compound the challenges associated with CBRN emergencies, emphasising the need for robust management structures and coordination mechanisms.

- Multi-agency oversight of CBRN emergency response in India involves different ministries and departments, each responsible for specific types of disasters, coordinated by the Ministry of Home Affairs.

- The Incident Command System (ICS) ensures streamlined coordination among various agencies and prevents duplication of efforts during emergencies, with designated officers leading response efforts at each level.

- The National Disaster Response Force (NDRF) plays a crucial role in CBRN emergencies, conducting assessments, rescues, and decontamination operations, while also conducting capacity-building exercises.

- Efforts to address challenges in CBRN emergency response include enhanced training, public awareness, technological innovation, and better coordination mechanisms, alongside strengthening local capacities and fostering international cooperation.

- There is a need for an umbrella organisation dedicated to CBRN issues in India, revisiting India's nuclear doctrine concerning CBRN, encouraging private sector involvement, and potentially adjusting treaties and conventions related to CBRN to address contemporary challenges effectively.

OPENING ADDRESS

Lt Gen Dushyant Singh, PVSM, AVSM (Retd), Director General CLAWS

CBRN threats are akin to the omnipresence of God, universally recognised as an ever-present reality. Just as everyone acknowledges the existence of God, it is widely understood that threats surround us, with CBRN representing one of the most significant among them. Having established the looming threat posed by CBRNs, the pertinent question arises: Is the Indian establishment adequately prepared to tackle these pervasive dangers?

Despite previous beliefs that CBRN threats were diminishing as global cooperation increased, recent events have starkly demonstrated the opposite trend. India itself has experienced numerous CBRN disasters, underscoring the undeniable reality of the threat. Mitigating these threats is not just a matter of national security but also a global imperative, as evidenced by the recent Covid-19 pandemic.

The Covid pandemic has revealed the potential for the weaponisation of viruses, despite their intrinsic potential for beneficial use. Furthermore, the use of chemical weapons is on the rise, despite significant progress made through international treaties to prevent their proliferation. This increase can be attributed to the incremental development of grey-zone warfare tactics.

Moreover, countries continue to engage in nuclear sabre-rattling, necessitating a reassessment of our strategic posture. The involvement of India's neighbours, China and Pakistan, in nuclear proliferation underscores the importance of monitoring the evolving dynamics of the nuclear threat and revisiting our doctrine accordingly.

Recent conflicts, such as the Russia-Ukraine conflict, have highlighted the presence of bio labs in conflict zones, emphasising the need to secure frontiers and achieve self-reliance. Accidents can occur unpredictably, underscoring the importance of preparedness in both peacetime and wartime scenarios.

The past incidents involving CBRN in India serve as stark reminders of the need to revisit existing doctrines and initiate research and development to address emerging issues. Additionally, positional warfare strategies related to CBRN should be reviewed from an Indian perspective to ensure their effectiveness.

In conclusion, remaining vigilant and resilient is paramount to safeguarding India’s CBRN national interests, requiring concerted efforts and strategic adjustments to mitigate these ever-evolving threats effectively.

KEYNOTE ADDRESS

Lt Gen Tarun Kumar Aich, PVSM, AVSM, DCOAS (Strat)

CBRN poses significant ramifications for India's national interest, presenting a formidable challenge to global security. The high probability of non-state actors exploiting CBRN for their own purposes further compounds the threat. Recent events have underscored a concerning decrease in the efficacy of treaties and conventions aimed at addressing CBRN threats, resulting in a notable rise in such dangers. This emphasises the urgent need for enhanced measures to control CBRN events effectively.

In the midst of ongoing political and economic turmoil, there is mounting debate about whether states should consider employing CBRN agents. The risk of misplaced hyper-nationalism leading to unwarranted events heightens the importance of prudent decision-making and thoughtful consideration of the implications involved.

To effectively confront CBRN threats, immediate action is imperative, including the mobilisation of resources and the establishment of high-level situational awareness. Prioritising focused research on various aspects of CBRN and their societal impact, alongside measures to safeguard first responders, is crucial.

Additionally, thorough assessment of equipment requirements and production costs for addressing CBRN threats is essential. Adequate training and coordination are vital, as the effectiveness of equipment heavily relies on the competence of those tasked with its operation. These concerted efforts are indispensable for mitigating the risks posed by CBRN threats and safeguarding national security interests effectively.

GLOBAL NUCLEAR LANDSCAPE WITH FOCUS ON CHINA AND PAKISTAN WITH IMPLICATIONS FOR INDIA

Air Marshal Rajesh Kumar, PVSM, AVSM, VM (Retd)

Key Points

1. **Global Nuclear Capabilities:** The global nuclear landscape is characterised by the presence of around 12,512 nuclear warheads, primarily held by Russia and the United States. China follows closely behind, with other nuclear powers such as France, the UK, and India also possessing significant arsenals. Out of the 12512 warheads, 9576 are ready to use in military stockpiles. So far, there are four countries with nuclear triads. These are the US, Russia, China and India. Other nuclear powers are Pakistan, Israel (undeclared) and North Korea (undeclared).

2. **Table 1: Nuclear Capabilities of Countries**

Ser	Country	ICBM/ IRBM	SSBN	Nuclear Capable Ac	S Bomber
1.	US	●	●	●	●
2.	Russia	●	●	●	●
3.	China	●	●	●	●
4.	France	x	●	●	x
5.	UK	x	●	x	x
6.	India	●	●	●	x
7.	Pakistan	●	*	●	x
8.	Israel	●	#	●	x
9.	N. Korea	●	&	x	x

***** developing nuclear-armed cruise missiles. **#** has nuclear cruise missiles.
& efficacy unknown.

3. **Nuclear Doctrines:** Various nuclear powers have distinct doctrines governing the use and deployment of nuclear weapons.

(a) **The US** emphasises strategic deterrence and maintains a policy of no first use, only considering nuclear retaliation in response to a significant attack.

(b) **Russia's** doctrine revolves around retaliation against threats to critical national infrastructure.

(c) **China's** nuclear strategy focuses on minimal deterrence but shows concerns about maintaining its credibility amidst conventional military advancements.

(d) **France** considers all its nuclear weapons to be strategic and reserved for the defence of France's 'vital interests'.

(e) **The UK** has stated that it remains 'deliberately ambiguous about precisely when, how and at what scale' it would contemplate the use of nuclear weapons.

(f) **India's** nuclear doctrine states no first use, minimum credible deterrence and massive retaliation.

(g) **Pakistan** has officially not declared its nuclear doctrine. However, its leadership has asserted the first use, which is India-specific and, often highlighted "flexible deterrence".

(h) **North Korea**, in 2013, passed the Law on the Position of a Self-Defence Nuclear Power which states that a nuclear arsenal would only be used against hostile nuclear powers if they were attacked or invaded the country.

4. **Pakistan's Nuclear Posture:** Pakistan's nuclear posture includes its primary aim at India, with the acknowledgement that nuclear weapons would be employed if deterrence fails in specific scenarios. These scenarios encompass instances where India launches an attack resulting in the conquest of a significant portion of Pakistan's territory, termed the "space threshold," or if India inflicts substantial damage upon Pakistan's land or air forces, known as the "military threshold." Additionally, nuclear weapons could be deployed if India enacts economic strangulation upon Pakistan or if it incites political destabilisation or significant internal subversion within the country, labelled as "domestic destabilisation."

5. Pakistan's nuclear posture highlights the potential use of nuclear weapons in a conventional arena to offset the conventional imbalance compared to India. This strategy aims to allow for proxy warfare without the fear of direct retaliation, effectively leveraging nuclear capabilities to create instability at lower levels to foster stability at higher levels.

6. **China's Nuclear Expansion:** China's nuclear capabilities include the surpassing number of land-based fixed and mobile Intercontinental Ballistic Missile (ICBM) launchers compared to the United States. China has developed three nuclear silo fields located in Yemen, Hami, and Ordos, and has deployed JL-3 missiles on Type 094 submarines. Additionally, China has deployed dual-capable DF-26 missiles and designated a nuclear role for the H-6N aircraft while continuing to develop the H-20 bomber. Furthermore, China is in the process of developing the Type 096 Submarine-Launched Ballistic Missile (SSBN) and expanding its warhead capabilities. These advancements signify China's expanding nuclear arsenal and evolving capabilities in the realm of strategic deterrence.

7. **China's Strategic Dilemma:** Chinese strategists are grappling with a multitude of nuclear challenges amidst heightened global risks. These include concerns over the

United States' advancements in both offensive and defensive nuclear systems, the proliferation of nuclear arsenals within regional powers, and mounting pressure for China to engage in nuclear arms control discussions before its deterrent capabilities are fully developed. Compounded by a minimum deterrence strategy, wherein nuclear forces have not been prioritised in resource allocation within the People's Liberation Army (PLA), the debate extends beyond nuclear deterrence to encompass conventional deterrence as well. This juxtaposition underscores the delicate balance China must maintain between its nuclear and conventional capabilities to ensure comprehensive deterrence in an increasingly complex security landscape.

8. **Implications for India:** The escalation of China's nuclear capabilities and Ballistic Missile Defence (BMD) systems, coupled with the deployment of dual-capable missiles under a single command, poses significant challenges for India's second-strike capability and increases the risk of miscalculation. Furthermore, the evolving landscape of cyber warfare during crises can lead to misinterpretation of intentions, adding another layer of complexity. Pakistan's deployment of Tactical nuclear weapons exacerbates command and control issues, heightening the possibility of inadvertent release. To address these concerns, India must prioritise the modernisation of its delivery systems across land, sea, and air domains. Enhancing the survivability of its nuclear arsenal is imperative, necessitating a review of current doctrines and a reassessment of the concept of Minimum Credible Deterrence. Additionally, consideration should be given to the development of strategic bombers, nuclear cruise missiles, and investments in BMD and Space-Based Infrared System (SBIRS) technologies. In navigating this precarious global landscape, international cooperation is essential to mitigate geopolitical tensions, curb arms races, and address pressing environmental and humanitarian challenges.

9. **Strategic Ambiguity Debate:** While some argue for India to adopt strategic ambiguity akin to China's approach, it's a contentious proposition. Strategic ambiguity introduces risks of misinterpretation and miscalculation, potentially escalating conflicts inadvertently. Therefore, maintaining clarity in India's nuclear doctrine, emphasising no first use, and enhancing conventional capabilities alongside nuclear deterrence remain crucial strategies for safeguarding national security interests.

10. **Future Strategic Imperatives:** India must focus on modernising its nuclear arsenal, investing in early warning systems, and enhancing strategic capabilities to navigate the evolving nuclear landscape effectively. Additionally, prioritising international dialogue and cooperation to mitigate nuclear risks while advocating for disarmament initiatives remains imperative. With strategic foresight and proactive measures, India can navigate the complexities of the nuclear landscape while safeguarding its national interests.

11. **Clear Communication and Understanding of Each Other’s Nuclear Capabilities:** Ambiguity in signalling intentions with nuclear weapons can lead to misunderstandings and miscalculations between nations. Clear communication and understanding of each other's nuclear capabilities are crucial for strategic stability.

12. **Use of AI in Nuclear Command:** Recent discussions between the US and China regarding the use of AI in nuclear command and control highlight the need for clarity and transparency in nuclear policies.

BIO-SECURITY AND BIO-SAFETY RISKS AND THEIR MITIGATION

Dr Mrinmayee Bhushan, Distinguished Fellow, Strategic Research and Growth Foundation

Key Points

1. **Challenges of Biological Warfare and Plausible Deniability:** Biological warfare is particularly concerning due to its unpredictable nature and the difficulty of attributing attacks to specific actors, providing plausible deniability.

2. Unit 731, a covert biological and chemical warfare research and development unit of the Imperial Japanese Army during World War II, conducted extensive research into bioweapons. Within the unit's research, they developed and tested various innovative bioweapons, including insect-based methods of delivery for diseases such as plague.

3. Despite committing significant war crimes, including conducting lethal human experimentation, members of Unit 731 were not held accountable for their actions, largely due to biological actions giving room for plausible deniability.

4. **Threat of Neurowarfare and Cognitive Manipulation:** Both China and the United States are investing in neuro warfare and mind control experiments as part of their military research and development efforts. Reports suggest that China has been involved in bioweapons programs, raising concerns among the international community about the proliferation of biological weapons.

5. China's Neurostrike Programme of the CCP is rooted in modern perceptions of 21st century warfare, where cognitive and psych domination is as important as physical supremacy, by leveraging neuroscience, biotechnology and information technology advancements, along with multidisciplinary insights from the domains of military science, psychology and the overall domain of technology.

6. Neurowarfare, which involves manipulating brain function and cognition, has emerged as a potential future threat, with implications for military strategies and national security.

7. **Technological Convergence and Blurred Weapon Distinctions:** Modern advancements in technology have blurred the distinction between biological and chemical weapons, making it challenging to differentiate between the two and to defend against them effectively. Technological convergence blurs the line between offence and defence, requiring nations to adapt their defence strategies to address emerging threats effectively.

8. **Dual-Use Potential of Emerging Technologies:** Emerging technologies like synthetic biology and artificial intelligence have dual-use potential, meaning they can be used for both peaceful and military purposes, including the development of bioweapons.

9. **Safety Protocols and Oversight for High-Containment Laboratories:** Concerns have also been raised about the potential for accidental or deliberate lab leaks from high containment laboratories conducting research on dangerous pathogens, highlighting the need for strict safety protocols and oversight.

10. **Learning from Global Biodefense Strategies:** India can learn valuable lessons from global biodefense strategies and initiatives, adapting successful approaches to suit its own security needs and challenges. Policy such as the National Biodefense Strategy of the United States, despite failing to adequately prepare and mitigate the Covid-19 Pandemic, holds valuable lessons Indian policymakers can learn from.

11. **Comprehensive Biodefense Strategy for India:** India requires a comprehensive biodefense strategy to protect against potential biological threats, both from state and non-state actors.

12. **Adaptation of Surveillance and Defence Strategies:** To counter evolving threats, surveillance and defence strategies must adapt to incorporate advancements in technology, enabling early detection and response to potential biological threats.

13. **Public-Private Partnerships for Biodefense:** Public-private partnerships are essential for enhancing biodefense capabilities, leveraging the expertise and resources of both government and private sectors.

14. **Legislation, Enforcement and Surveillance:** Legislation, enforcement, and surveillance form the foundation of preparedness efforts, ensuring that the necessary legal frameworks are in place and enforced to prevent and respond to biological threats.

15. **Establishment of National Biochemical Defence Agency:** One of the recommended measures has been the establishment of a National Biochemical Defence Agency, to coordinate and streamline biodefense efforts across various sectors and stakeholders.

16. **Fast-tracking Capacity Building:** Fast-tracking capacity building involves accelerating the development of infrastructure, expertise, and resources needed to respond effectively to biological threats, recognizing the urgency of the situation.

17. **Global Cooperation for Biodefense:** Joint efforts among nations are crucial to building a robust global biodefense network, facilitating information sharing, collaboration, and mutual assistance in the event of a biological threat.

18. The cultivation of robust public-private partnership networks, integrating the capabilities and resources of both sectors to create a flexible and adaptive defence strategy can help in many ways, such as in the creation and operation of plug-in biodefense models for surveillance and tracking of diseases.

19. **Leveraging Indigenous Expertise in AI and ML:** Leveraging indigenous expertise in artificial intelligence and machine learning can enhance India's biodefense capabilities, enabling more effective surveillance, detection, and response to biological

threats. India has demonstrated its intellectual capacity and resilience in facing various challenges, including those related to public health and national security.

20. **Partnering with International Initiatives:** Partnering with international organisations and initiatives, such as the Global Virome Project which aims to identify and characterise viruses worldwide to better understand and prepare for potential pandemics and emerging infectious diseases, will help the nation tap into the international pool of expertise and information. This will enable India's own scientific community and policy experts to be prepared for the threats of today, and the future.

21. **Role of Government Agencies in Driving Preparedness:** Government agencies such as the Ministry of Defence (MoD) and the National Security Council Secretariat (NSCS) can play a leading role in driving joint preparedness efforts and coordinating biodefense initiatives.

22. **Investment in Research, Technology, and Partnerships:** India needs to adapt its defence strategy to address modern threats, including those posed by bioweapons, by investing in research, technology, and partnerships to enhance its capabilities.

CHEMICAL WARFARE: PERSISTENT AND REAL THREATS

Col (Dr) Ram Athavale (Retd)

1. **Chemicals as Poor Man's Atom Bomb:** Chemicals, also called as the poor man's atom bomb are not accorded the due importance that is required for varied reasons. One reason being that almost all the nations, i.e., 193 states being signatories to the Chemical Weapons Convention (CWC). There is a thinking that such conditions may not arise in warfare situations.

2. **Historical Context of Chemical Warfare:** A brief on CW history: Dr Fritz Haber, a German scientist had started the use of chemicals in WWI. He was awarded the Nobel Prize for the means to convert ammonia from air. From there, the development and proliferation of chemicals took place at a rapid rate across the world.

3. **Versatility and Utility of Chemical Weapons:** Chemicals are potent weapons, not just for mass casualties but are also utilised for targeted assassinations and limited causality creation. Peacetime use of chemicals has increased, for instance common chemicals like chlorine and ammonia are used extensively. The use of CW Agents has also increased like blister agents (lewisite and mustard gas), blood agents (hydrogen and cyanide) and among others.

4. **Emerging Trends in Chemical Warfare Research:** Currently, the ongoing research in the usage of riot control chemicals for warfare situations to affect the mental and physical capability of the enemy. Also called as bio regulators, where chemicals are used to temper the mood and fighting capabilities of the soldiers to make them lethargic and lose their focus.

5. **Weaponization of Chemicals:** Chemical weaponization is a concept of putting chemicals in devices which can be delivered on the battlefield. Many types of such weapons systems are being developed like artillery shells, mortar bombs and drop bombs from aircraft. A lot of research is going on in weaponizing chemicals to be launched from drones for warfare purposes. Terrorist organisations have already utilised such systems for crowd dispersal and to create chaos.

6. **Concerns about Toxic Industrial Chemicals:** The toxic industrial chemicals are also of concern. Even low hazard chemicals like Styrene Monomer can cause casualties as witnessed in the 2020 Vizag industrial chemical leak incident which caused 14 deaths and hundreds of people had to be hospitalised due to chemical poisoning. Sabotage or deliberate release of such toxic industrial chemicals are a matter of concern. In the Bhopal gas disaster, 25,000 lives were lost. Such is the potency of chemicals that they are present in our everyday surroundings like ink in our pens and have the capacity to be converted into toxic substances by introducing reactants.

7. **Proxy Warfare and Non-State Actors:** Despite both our adversaries being signatories of CWC, there is a high likelihood of them using proxy non-state actors like terrorist organisations to deploy chemical weapons in conventional warfare scenarios. This does not require sophisticated weapons, it can be done in a crude manner like blowing up chlorine cylinders like done by terrorists in Afghanistan and Iraq, also called

as chemical dirty bombs. Thus, our troops need to be trained and prepared to face such scenarios where chemical dirty bombs are used.

8. **Incidents and Cases of Chemical Terrorism:** Toxic terror has existed since a long time, from the 1995 Tokyo Sarin attacks to the 2020 poisoning of Russian opposition figure, Alexei Navalny. Cases like Kim Jong-nam's assassination in 2017 due to mixing of two benign chemicals and causing VX nerve breakdown. Such chemicals called precursors are highly potent in the hands of a professional.

9. According to SIPRI, from 2014 to 2017, ISIS has used chlorine and sulphur mustard in 52 incidents. There are many such terror incidents which may take place and the NDRF is equipped to deal with such incidents. However, the capacity of our first responders (local police) to deal with such incidents is questionable.

10. **International Efforts to Combat Chemical Threats:** The Organisation for the Prohibition of Chemical Weapons (OPCW) had confirmed in July 2023 that all declared chemical weapons have been destroyed. However, the reality is far from that. For instance, Syria was forced to be the signatory to CWC in 2013 after the Ghouta attacks but continued to use chemical weapons from 2016 to 2018. This puts a question on the credibility of the OPCW on conducting oversight, verification of the existence of chemical weapons and punishing the violating states. Similarly, many labs conducting research and testing of chemical weapons exist in North Korea (approx. 2,500 to 5000 metric tons of chemical weapons).

11. Despite the awareness in the international community, nobody is policing them and questioning the sources from where they obtain the required materials. There is a complete nexus in the underworld where such proliferation of chemical weapons takes place.

12. Pakistan is considered as the respected member-state of the OPCW, having ratified the CWC in 1997 and subjecting many of its institutions to international inspection. However, the Pakistani police themselves have caught a terror organisation making chemical weapons inside its territory. There are allegations against Pakistan for having links with North Korea, Syria and China for sharing technologies and expertise in a clandestine manner.

13. Due to deniability by the host nations, there is an unseen threat of chemical weapons being used by non-state actors. China has faced the horrors of the potency of the chemical weapons in the past and there are still unexploded shells from the world war era. Beijing despite being a signatory to CWC, we cannot deny the Chinese involvement at clandestine levels.

14. **Role of International Organizations:** At the international level, the United Nations (UN) has brought out the UNSCR 1540 and 1673 international conventions against CBRN terrorism. Further joint initiatives between the UNICRI's CBRN Risk Mitigation Program and EU CBRN Centre for Excellence have managed to make good progress. More than 60 nations are involved in educating and raising their risk mitigating capabilities, to develop laws and ensure non-proliferation of sensitive materials.

15. **Strategic Trade Control Initiatives:** The World Customs Organisations (WCO) is working on preventing proliferation of toxic chemicals between various ports and states. The CWC having completed its initial goal of destroying verified chemical weapons, is now looking at non-proliferation of toxic chemicals. Yet in 2016, the Pakistani Customs caught 22 tons of Acetic Anhydride, used for making purified heroin and explosives. It was traced back to Tanzania, which has no facilities to manufacture. The Interpol investigation found out that it had crossed 5 states and was meant to be delivered in Chinese ports.

16. **Concerns about Chemical Storage and Safety:** In the recent Beirut blast, 270 tons of ammonium nitrate went up in flames and decimated half the city. This raises the concerns on how many of our ports have stored such toxic chemicals. Environmental and Toxic Waste Conventions like Basel Convention, Rotterdam Convention and Stockholm Convention were aimed at preventing, dumping and waste management of toxic chemicals.

17. **India's Commitment to Strategic Trade Control:** There are 3 major initiatives for strategic trade control for chemical weapons. This includes the Australia Group, the Missile Technology Control Regime (MTCR) and the Wassenaar Arrangement. India is party to all the three agreements.

18. **What India Needs**:

(a) To develop a comprehensive National CBRN Security Strategy. Currently we have a strategy for response but none for prevention and policy development.

(b) Once we have an encompassing strategy, the next step is developing a national CBRN Action Plan defining the duties of all involved actors, responsibilities, and activities to be carried out.

(c) We have developed 3 Nodal Agencies (MoHFW, MoEFCC and DAE) and a plethora of laws. But they need to be aligned with international initiatives and conventions.

(d) We have done a lot on crisis and consequence management (NDMA and NDRF) but have lagged in threat prevention in a holistic manner.

(e) We have laws like CWC Act 2000, WMD Act 2005 and DM Act 2005. However, there are many more pending drafts which have not been carried out despite crossing the deadlines. Like the National Action Plan for Chemicals 2019 and Rules on Hazardous Substances 2011.

(f) Unless we align our laws with the rest of the world, our chemical industries will not be up to the mark.

(g) There are unforeseen dangers due to the advancements in the AI, which has the capacity to generate formulas for toxic chemicals and this requires regulation.

19. **Way Forward**:

(a) There is a need to enhance awareness regarding CBRN amongst the common public.

(b) To develop a comprehensive National CBRN Strategy and Plan.

(c) To build CBRN intelligence to stop proliferation.

(d) To streamline incident prevention, enforcement, and oversight.

(e) To enhance first response capacity and on-site response.

(f) To build national stockpiles of antidotes, drugs, and emergency supplies.

(g) To strengthen the working of National Authority Chemical Weapons Convention (NACWC) by giving more powers to perform effective oversight functions.

(h) Need to develop a National CBRN Culture to instil the values and knowledge at societal and early educational levels.

(i) Need to create a National CBRN Centre of Excellence, to develop policies, structured training, research and to collaborate with similar institutions across the world.

CAPACITY BUILDING FOR NEW AGE CBRN THREATS

Dr D T Selvam

1. **Importance of Capability Building:** In navigating the realm of CBRN threats, it is crucial to emphasise capability building. While historical perspectives have been extensively covered, my focus shifts towards understanding the essential technologies and tools required for an effective response.

2. **Emphasis on Detection:** Detection serves as the cornerstone of our response strategy. Accurately identifying the presence of hazardous agents guides subsequent response measures, including evacuation, quarantine, or containment.

3. **Protection and Medical Management:** Following detection, prioritising protection becomes paramount. First responders must be equipped with adequate protective gear to mitigate immediate risks. Additionally, efficient medical management protocols are necessary to treat individuals exposed to hazardous agents, ensuring their safety and well-being.

4. **Decontamination and Training:** Decontamination procedures play a vital role in neutralising the effects of hazardous agents, making affected areas safe for re-entry. Moreover, rigorous training and exercises are essential to familiarise responders with equipment operation, response protocols, and coordination strategies.

5. **Sample Collection and Analysis:** Effective sample collection techniques are critical for subsequent analysis and confirmation of hazardous agents. The ability to collect and analyse samples accurately aids in understanding the scope and nature of the threat, enabling informed decision-making and response planning.

6. **Current Capabilities and Future Expectations:** Presently, we possess a range of detection technologies, from point detectors to advanced portable devices like GC-MS, enabling precise identification of chemical agents. However, the biological domain remains complex, necessitating further research and development to enhance detection capabilities.

7. **Ongoing Advancements:** Despite challenges, significant progress has been made in developing sophisticated technologies and systems across all facets of CBRN defence. Continuous innovation, rigorous testing, and comprehensive training are essential to ensure readiness to address evolving CBRN threats effectively.
Certainly, here are the key points summarised in British English with a paragraph for each point:

8. **Biological Threats:** Detecting biological agents presents unique challenges compared to chemical threats. While chemicals need to be introduced, bacteria and viruses are omnipresent, making detection more nuanced. Technologies for detecting biological agents are still in development stages, but advancements are being made towards indigenous solutions.

9. **Chemical Threats:** Unlike biological agents, chemicals need to be introduced into the environment, making detection more straightforward. However,

advancements in chemical warfare have introduced challenges like binary agents, complicating detection methods. Indigenous development of detection technologies is progressing, but keeping pace with evolving threats remains a priority.

10. **Radiation Threats:** Various radiation detection equipment, suitable for different scenarios, are indigenously available. These technologies are deployed to detect and monitor radiation effectively. However, continuous development and deployment are necessary to keep up with evolving radiation threats.

11. **Protective Gear:** Personal protective equipment, including suits, masks, and canisters, forms a crucial defence against CBRN threats. Continuous advancements aim to improve comfort and durability while ensuring effective protection against diverse threats.

12. **Shelters and Decontamination:** Collective shelters and decontamination equipment are essential for providing safe havens and mitigating contamination risks. Ongoing developments focus on enhancing portability, efficiency, and effectiveness of these systems.

13. **Medical Management:** From first aid kits to portable decontamination systems, medical management plays a vital role in addressing CBRN incidents. Development and deployment of medical countermeasures, including drugs and diagnostics, are critical for saving lives in emergencies.

14. **Capacity Building and Infrastructure Development:** Strengthening infrastructure and capacity building are essential for handling CBRN threats effectively. This involves not only technological advancements but also training, preparedness assessments, and stakeholder involvement at various levels.

15. **Technological Innovation and Collaboration:** Encouraging innovation and collaboration is crucial for advancing CBRN defence capabilities. This includes fostering partnerships between government, industry, and research institutions to develop and deploy cutting-edge solutions.

16. **Addressing Cost and Shelf-Life Concerns:** Balancing cost-effectiveness and shelf life is a challenge in procuring CBRN equipment. While advancements have extended shelf lives, compromises must not jeopardise safety standards. Investments in newer technologies may incur higher costs but offer better protection and longevity.

CBRN DISASTER MANAGEMENT- NATIONAL PERSPECTIVE

Shri Kamal Mehra

1. **Terminology Associated with Disasters:** The National Disaster Response Force (NDRF) plays a vital role in addressing CBRN emergencies, equipped with capabilities to effectively respond to such crises. It is essential to understand the terminology associated with these emergencies, such as NBC (Nuclear, Biological, Chemical) and WMD (Weapons of Mass Destruction), as well as the evolving nature of threats posed by non-state actors.

2. Historically, terms like ABC (Atomic, Biological, Chemical) emerged during World War II, evolving into NBC in subsequent decades. The Canadian government initiated the use of CBRN, now adopted by many nations, including India. It encompasses a broad spectrum of hazardous materials, including those related to NBC, WMD, and CBRM emergencies.

3. **Real World Impact:** Instances like the Bhopal Gas Tragedy, the COVID-19 pandemic, and radiological incidents underscore the real-world impact of CBRN emergencies on civilian life. It is imperative to recognise the significance of preparedness and response strategies tailored to non-combat scenarios, given the potential for significant loss of life.

4. **Expanding Scope of CBRN Emergencies:** The understanding of CBRN emergencies extends beyond traditional industrial accidents, as demonstrated by incidents involving restricted chemicals used for personal harm. The deliberate misuse of such agents by antisocial elements could escalate into national emergencies, highlighting the need for heightened awareness and preparedness across society.

5. **International Examples and Consequences:** International examples, such as the radiological exposure in Goiânia, Brazil, underscore the far-reaching consequences of mishandling hazardous materials. Even minute quantities of radioactive substances can lead to widespread contamination, necessitating extensive decontamination efforts and resource allocation.

6. **Challenges and Preparedness Measures:** Challenges in detecting and identifying CBRN threats, coupled with limited training and equipment for responders, underscore the need for comprehensive preparedness measures. Coordination among stakeholders, robust infrastructure, and effective medical countermeasures are essential pillars of an effective response framework.

7. **Challenges of Misinformation and Infrastructure:** Misinformation and inadequate infrastructure further compound the challenges associated with CBRN emergencies. The management structure, established post-2005, provides a framework for coordinating national and state-level responses, with dedicated bodies like the NDMA and NDRF tasked with policy formulation and operational readiness.

8. At the state level, executive committees and disaster response forces are mandated to enhance preparedness and coordinate response efforts. These

mechanisms aim to mitigate the impact of CBRN emergencies and ensure a coordinated and effective response at all levels of governance.

9. **Stratification of Disaster Response in India:** In India, disaster response is stratified into three levels based on severity: Level 1, Level 2, and Level 3. Level 1 disasters can be managed within the resources of the state Disaster Management Authority (DDMA), whether occurring on-site or off-site. Conversely, Level 2 disasters require mobilisation of state resources, while Level 3 disasters, being more extensive, necessitate national or international assistance. This categorisation helps in efficient allocation of resources and coordination during emergencies.

10. **Multi-Agency Oversight of CBRN Emergency Response**: The Chemical, Biological, Radiological, and Nuclear (CBRN) emergency response framework in India is overseen by different ministries and departments, each responsible for a specific type of disaster. The Ministry of Environment, Forest and Climate Change handles industrial and chemical disasters, the Ministry of Health and Family Welfare deals with biological disasters, and the Department of Atomic Energy addresses nuclear and radiological disasters. Coordination among these bodies, alongside the National Disaster Management Authority (NDMA) and state authorities, is facilitated by the Ministry of Home Affairs.

11. **ICS as Central Framework:** Central to the response framework is the Incident Command System (ICS), adopted from the United States. The ICS ensures streamlined coordination among various agencies and prevents duplication of efforts during emergencies. Each level of response, from national to district, is led by a designated officer with suitable expertise, supported by a team comprising safety officers, information officers, and logistical support personnel.

12. **Role of NDRF in CBRN Emergencies:** The National Disaster Response Force (NDRF) plays a crucial role in CBRN emergencies, designated as one of the first responders. With specialised training and equipment, NDRF teams are deployed swiftly to assess, rescue, and decontaminate affected areas. Additionally, NDRF conducts capacity-building exercises and collaborates with other agencies for effective response.

13. **Addressing Challenges in CBRN Emergency Response:** Challenges in CBRN emergency response include technological advancements, resource limitations, unpredictability, and coordination issues. Efforts are underway to address these challenges through enhanced training, public awareness, technological innovation, and better coordination mechanisms. Strengthening local capacities, improving medical infrastructure, and fostering international cooperation are also key priorities to bolster India's resilience in dealing with CBRN emergencies.

CLOSING REMARKS

Maj Gen Abhinaya Rai, YSM, Officiating DGSP

1. During the seminar, CBRN threats were highlighted as highly active, bringing attention to the urgent need for solutions to counter these persistent dangers. To effectively tackle these threats, it is crucial for the Indian Armed Forces to adapt their syllabus, incorporating comprehensive training on CBRN-related matters to ensure readiness and preparedness.

2. One immediate requirement emphasised during the seminar was the establishment of an umbrella organisation dedicated to CBRN issues in India. Such an organisation would streamline efforts, enhance coordination, and facilitate a more cohesive response to CBRN threats.

3. Moreover, there is a pressing need to revisit India's nuclear doctrine concerning CBRN, acknowledging the evolving nature of these threats and the necessity of aligning strategic approaches accordingly.

4. In addition to governmental efforts, there exists a notable gap in private sector involvement in managing CBRN cases, particularly in the realm of chemical warfare. Encouraging and enabling private players to actively engage in CBRN management is crucial for comprehensive preparedness.

5. Treaties and conventions related to CBRN should be re-evaluated and potentially adjusted to better address contemporary challenges posed by these threats. This entails understanding the evolving nature of CBRN threats and adapting international frameworks accordingly to ensure effective mitigation and response strategies.

CONCEPT NOTE

CBRN has remained a front-runner amongst all strategic issues globally in the recent past. Major contributors to the growing concern over CBRN issues include COVID-19, alleged employment of chemical weapons by few countries despite international conventions and the renewed focus on nuclear weapons amidst the current dynamic global security environment.

The catastrophic effects of a tiny pathogen during the COVID-19 pandemic have converted the age- old 'Gun vs Bread' debate into a 'Missile vs Microbe' paradigm. In the nuclear domain, Russia-Ukraine war, North Korea's unabated tests and China's nuclear expansion seems to have encouraged other vulnerable nations to no longer acquiesce to non- proliferation regimes and seek nuclear weapons in their own national interests. Chemical weapons have also gained limelight due to few targeted attacks and alleged use in conflicts in the Kurdish region.

The technological breakthroughs in the CBRN domain and weapon delivery means due to disruptive technologies like Artificial Intelligence, Drones and Hypersonic Weapons have increased the security challenges multi-fold. The trans-national terrorism and hybrid nature of current conflicts further complicates the global security environment.

In addition, the vast global industrial base that deals with toxic material and chemicals, nuclear power plants/facilities and R & D facilities dealing with CBRN substances pose great risk of accidental CBRN disasters providing no or very less reaction time to the population as well as the responders.

Therefore, considering the catastrophic impacts of a CBRN contingency and unique security environment due to the two nuclear powered collaborating adversaries, India needs to develop capabilities for defending its national interests and its citizens from CBRN threats.

PROGRAMME

Time	Topic	Speaker
0900-0910	Opening Address	DG CLAWS
0910-0920	Keynote Address	DCOAS (Strat)
0920-1000	Global Nuclear Landscape with Focus on China and Pakistan with Implications for India	Air Marshal Rajesh Kumar (Retd)
1000-1040	Bio-Security and Bio-Safety Risks and their Mitigation	Dr Mrinmayee Bhushan, Distinguished Fellow, Strategic Research and Growth Foundation
1040-1120	**Equipment Display, Group Photograph and Tea**	
1120-1200	Chemical Warfare: Persistent and Real Threats	Col Ram Athavale (Retd)
1200-1250	CBRN Disaster Management-National Perspective	Mr Kamal Mehra
1250-1330	Capacity Building for New Age CBRN Threats	Dr D T Selvam
1330-1350	Closing Remarks	DGSP
1350-1500	Lunch & Dispersal	

PHOTO GALLERY

DG CE, DG CLAWS, DCOAS (Strat), Lt Gen Vinod Khandare and Offg DGSP

Lt Gen Vinod Khandare presenting memento to Air Marshal Rajesh Kumar

Lt Gen Dushyant Singh, DG CLAWS presenting memento to Dr. Mrinmayee Bhushan

Equipment display by DRDO labs and NDRF

HAZMAT Vehicle – NDRF

Lt Gen Vinod Khandare presenting memento to Col Ram Athavale

Lt Gen Dushyant Singh, DG CLAWS, presenting memento to Dr D T Selvam

Maj Gen Harpal Singh, DG CE, presenting memento to Mr Kamal Mehra

Maj Gen Abhinaya Rai, Offg DGSP, presenting memento to Brig MM Ramchandra

Lt Gen Dushyant Singh, DG CLAWS, presenting a memento to Lt Gen Vinod Khandare


सत्यमेव जयते