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INDIA'S NUCLEAR BLACK MARKET: A LOOMING GLOBAL SECURITY THREAT

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Abstract
The illicit trade and theft of nuclear and radioactive materials, commonly referred to as the nuclear black market, represents a profound challenge to global and regional security. India's nuclear program continues to face significant challenges due to persistent incidents of nuclear material theft and illicit trade. This research paper aims to report major incidents of theft and illicit trade of nuclear and radioactive materials in India from 1994 to 2024. It identifies key nuclear black-market actors and networks in India. Such as insider involvement, institutional breaches, political actors, smugglers, civilian and informal actors and networks. It evaluates the systemic vulnerabilities in India's nuclear security framework, which comprises inadequate physical protection and facility access, manual inventory and tracking systems, regulatory and oversight gaps, personnel vetting and insider monitoring gaps, transportation and border control vulnerability, lack of transparency and poor global nuclear security ranking. It also analyzes the geopolitical and technological factors driven by strategic interests, which have been prioritized over robust security oversight to counterbalance China. This encompasses India's non-signatory status to the Nuclear Non-Proliferation Treaty (NPT) and NSGs waiver, contributing to the black market's persistence. This not only compromises the credibility of India as a responsible nuclear state but also poses a direct threat to global security. The paper is concluded by highlighting the regional dynamics and global security implications, including the risks associated with nuclear proliferation. The source of the data is based on secondary data, including media coverage, reports of the International Atomic Energy Agency, and research articles. The significance of this study lies in its comprehensive approach to a critical yet less-studied area of concern. By analyzing the patterns and consequences of nuclear material trafficking, this paper urges the urgent need for enhanced nuclear material security measures in India and beyond.

1. INTRODUCTION

Nuclear technology has changed the nature of global security, where nuclear-armed countries have too much responsibility to safeguard their nuclear materials against theft and misuse. The illicit trade of nuclear and radioactive materials, commonly referred to as the nuclear black market, represents a profound challenge to global and regional security. As a developing nuclear

state following its initial nuclear test in 1974, India has put in place an effective nuclear program that can meet its strategic deterrence and energy requirements. Nevertheless, several cases involving theft of nuclear materials and illicit dealing have been reported several times, creating grave concerns that a nuclear black market may exist in the country. Such cases, involving significant quantities of uranium and high-value materials like Californium, include small-scale thefts by insiders and large-scale smuggling of materials, which suggests systemic vulnerabilities in India's nuclear security framework. The possible ripple effect of these gaps is devastating as it involves the possibility of nuclear terrorism, proliferation to rogue states or actors, and increased instability in the South Asian region (Nunoo, 2017), especially in the light of hostility between India and Pakistan. This research paper aims to report major incidents of theft and illicit trade of nuclear and radioactive materials in India from 1994 to 2024. It identifies key nuclear black-market actors and networks in India. Such as insider involvement, institutional breaches, political actors, smugglers, civilian and informal actors, and networks. It evaluates the systemic vulnerabilities in India's nuclear security framework, which comprises inadequate physical protection (Busch, 2002) and facility access, manual inventory and tracking systems, regulatory and oversight gaps, personnel vetting, and insider monitoring gaps. Among others, transportation and border control vulnerability, Lack of transparency, and poor global nuclear security ranking. It also analyzes the geopolitical and technological factors driven by strategic interests, which have been prioritized over robust security oversight to counterbalance China. This encompasses India's non-signatory status to the Nuclear Non-Proliferation Treaty (NPT) and NSGs waiver (Hanif & Muzaffar, 2024), contributing to the black market's persistence. This not only compromises the credibility of India as a responsible nuclear state but also poses a direct threat to global security. The paper is concluded by highlighting the regional dynamics and global security implications, including the risks associated with nuclear proliferation. The source of the data is based on the primary data, including media coverage, reports of the International Atomic Energy Agency, and research articles. The significance of this study lies in its comprehensive approach to a critical yet less studied area of concern. By analyzing the patterns and consequences of nuclear material trafficking, this paper urges the urgent need for enhanced nuclear material security measures in India and beyond.

1.1 Background of India's Nuclear Program

In 1974, the nuclear test initially named the Smiling Buddha was an event that not only changed Indian history but also the nuclear history of South Asia. Completed in the Pokhran test range in Rajasthan, the test used plutonium that was produced in the CIRUS reactor, which was supplied by Canada, and the heavy water by the United States. Officially described as a peaceful nuclear explosion, the test demonstrated India's nuclear capabilities and faced global condemnation and sanctions, isolating it from global nuclear trade. These sanctions, imposed by the Nuclear Suppliers Group (NSG) and Western powers, strained its nuclear security infrastructure due to limited access to international best practices. In 2003, the Indian Nuclear Command Authority (NCA) was established to ensure civilian oversight of India's nuclear arsenal (Pant, 2007). The NCA consists of a political council constituted by the Prime Minister, which makes strategic decisions, and the executive council headed by the National Security Advisor that offers technical and operational advice (Vishwanathan, 2022). Such a structure is intended to provide optimal strategic flexibility without compromising command and control. However, its effectiveness depends on the security of nuclear materials and facilities. The global non-proliferation regime relies heavily on the security and accountability of fissile materials. International efforts have mostly focused on states like North Korea and Iran for the proliferation of nuclear materials. However, India's record, mostly perceived as a "responsible nuclear state," reveals a troubling pattern of nuclear theft. Since the 1980s, repeated incidents of theft and illicit trafficking of uranium, depleted uranium, and other radioactive substances such as Californium have been reported in India. The frequency, scale, and opacity of these incidents raise serious concerns over India's nuclear safety framework and regulatory controls. This also constitute a

systemic challenge to regional and international security.

2. Chronicles major incidents of theft and illicit trade from 1994 to 2024

Historical data indicate that nuclear theft in India began emerging as early as the 1970s. By the 1980s, the magnitude of the threat had grown significantly (Jalil, 2024). After the CIA intelligence assessments suggested about India's ambitions to develop advanced nuclear weapons like the hydrogen bomb. This period also witnessed attempts to acquire sensitive materials through covert channels. Such as the interception of a beryllium shipment in Vilnius in 1994, of worth $24 million, allegedly linked to Indian or North Korean buyers. Furthermore, the systemic weaknesses of India's nuclear safety and security became evident after the Indian parliamentary report. The report revealed 147 security-related incidents at atomic energy facilities between 1995 and 1998 alone(Raza Ali, 2019). The earliest reported incidents of nuclear theft in India started surfacing in the 1980s, culminating in significant cases by the 1990s, after India's 1998 nuclear tests (Mazari M Shireen, 2021). The expansion of India's nuclear program, coupled with internal insurgencies and porous borders, created rich ground for sub-national groups and criminal networks to exploit nuclear vulnerabilities. The following section provides an account of major nuclear theft incidents in India.

2.1 Early Incidents (1994–2005)

In November 1994, Indian police in Meghalaya's Domiasiat region arrested four smugglers and seized 2.5 kg of uranium, marking a critical breach in nuclear material security (Cherail Koshy, 1994). The Central Bureau of Intelligence (CBI) dismantled a major uranium smuggling operation in Tamil Nadu in 1998. During the operation 8 kg of granulated nuclear material was recovered (SAT Editorial Desk, 2021). Further raids led to the recovery of another 2 kg of uranium and 31 kg of platinum. The Indira Gandhi Centre for Atomic Research (IGCAR) initially confirmed the presence of weapons-grade uranium (U-235 and U-238), but later retracted its findings, claiming the substance was merely 'limonite'. The abrupt change highlights serious doubts on the institutional credibility of Indian nuclear agencies.

In 1998, another significant case of the same nature was reported in West Bengal. A politician from the opposition party was arrested while transporting over 100 kg of uranium (Levy Andrian, Smith Jeffry. R, 2015). Which is extremely rare. Furthermore, a police dossier seen by the center states that ten more people connected with smuggling were arrested two years after this, with 57 pounds of stolen uranium. In 2000, Indian intelligence seized 25 kg of uranium in Mumbai from a scrap dealer linked to Bibi Cancer Hospital. Initially, the hospital denied having any such material. However, later admitted selling medical equipment containing radioactive components. The incident revealed the poor institutional record-keeping and radiation waste management in the medical sector of India (Mazari M Shireen, 2021). In another incident in 2001, a uranium theft case came to light when police in West Bengal revealed that they had arrested two men with more than 200 grams of semi-processed uranium (Time of India, 2001). In 2003, Indian agencies caught members of a terror outfit in a village on the Bangladesh border with 225 grams of milled uranium.

2.2 Mid-Period Incidents (2006–2015)

In 2006 a container holding radioactive material was reported stolen from a fortified research facility in eastern India. This theft from a secured nuclear installation shows that even high-security zones are not protected to theft. This also raises concerns over the so-called robustness of India's nuclear material safeguards. In the year 2008, Police in Supaul, Bihar, along the Indo-Nepal border, detained 4 kg of uranium in a smuggling attempt. The incident highlighted not just internal mismanagement but the risk of cross-border nuclear material movement (Hindustan Times Correspondent, 2008).

In 2009, three people were detained for illegal possession of 5 kg of depleted uranium in Mumbai (Express News Service,2009). The incident added to the growing concerns over the radioactive materials moving outside official channels. Given the growing pattern of such incidents highlights the systemic weaknesses in

record tracking and post-usage disposal procedures of India's nuclear institutions. Another serious insider incident occurred in South-West India. An employee at a nuclear facility poisoned dozens of colleagues with radioactive isotopes (Guardian, 2009). This deliberate internal breach within nuclear installations highlights inefficient staff vetting and internal surveillance. The incident proved that internal threats posed equal risks or even greater than external threats and in 2013, leftist guerrillas in northeast India illegally obtained uranium ore from a government-run milling complex in northeast India and strapped it to high explosives to make a crude bomb before being caught by police, according to an inspector involved in the case (Levy Adrian, 2015).

2.3 Recent Incidents (2016–2024). In 2016, in Thane, Maharashtra, Indian police detained nearly 9 kg of depleted uranium from individuals. Though considered as depleted, the material remained highly toxic and radioactive. The ambiguity, opacity on the origin and the civilian possession of such dangerous material point to major regulatory loopholes in the control and dumping of radioactive substances(NDTV, 2016). In 2018, authorities in Kolkata exposed a uranium smuggling racket and recovered 1 kg of radioactive material, worth approximately 30 million Indian rupees ($440,000)(Dwaipyan Ghosh, 2018). The inquiry revealed the presence of both local and international buyers. This suggests a sophisticated black-market network in India with possible international links. In May 2021, Maharashtra Anti-Terrorism Squad (ATS) arrested two people for carrying 7.1 kg of natural uranium (Department Of Atomic Energy India, 2021). Which was valued $2.8 million. Indian police confirmed the material was radioactive. Later, Indian police in Jharkhand arrested seven people and seized 6.4kg of uranium. In the following year on 26 August 2021, 250kg of uranium variant, a highly radioactive and toxic substance, worth $573 million, was confiscated in Kolkata. This raised doubts about insider threats and compromised material handling protocols. In August 2024, Bihar Police arrested a group of three individuals with 50 grams of Californium. A highly radioactive and rare substance valued at over Indian rupees 8.5 billion (roughly $101 million. In July 2024, five more individuals were arrested in Dehradun with a radioactive device, black boxes (The New Indian Express, 2024). Which was suspected to be linked to the Bhabha Atomic Energy Center in Mumbai (BARC). Media reports stated that at least two black boxes resembled those typically used for transporting radioactive materials. One of the boxes contained a radiography camera marked with the official seal of the Board of Radiation and Isotope Technology, under the Department of Atomic Energy at the Bhabha Atomic Research Center (BARC), India's leading nuclear facility.

Major Theft and Illicit Trade Incidents in India - 1994 to 2024

Year	Location	Nature of Incident	Quantity	Material Involved	Details
1994	Meghalaya (Domiasiat)	A gang of smugglers was arrested	2.5 kg	Uranium	Seized by Meghalaya Police
1998	Tamil Nadu	Uranium smuggling racket busted by CBI	8 kg (later +2 kg)	Uranium (U-235, U-238)	Initially tested as enriched uranium, later downgraded to 'limenite' by IGCAR.
1998	West Bengal	A politician was arrested with uranium	>100 kg (Later 57 pounds Uranium	Uranium	A case involving a political figure, and later a police dossier seen by the center states that ten more people connected with smuggling were arrested two years after this,

					with 57 pounds of stolen uranium.
2000	Mumbai (Bibi Cancer Hospital)	Scrap dealer arrested	25 kg	Uranium	The hospital denied, then admitted that machine parts may have contained radioactive material.
2000	Mumbai Police	Scrap dealer arrested	8.3kg	Uranium	At Lalavati Hospital, Bandra, the fissile material was found in the custody of a scrap dealer
2001	West Bengal	Two men arrested	>200 g	Semi-processed uranium	Likely originated from a civilian or research facility
2003	Near the Bangladesh border	Terror outfit members caught with uranium	225 g	Milled uranium	Indicative of cross-border smuggling
2006	Eastern India	Radioactive material was stolen from a research facility	Container holding radioactive material	Radioactive material	Security breach at fortified facility
2008	Supaul, Bihar (Indo-Nepal border)	Police seizure	4 kg	Uranium	Border region, suggesting international trafficking
2008	South-West India	Poisoning incident at nuclear facility	Dozens exposed	Radioactive isotopes	Insider threat at the facility
2009	Mumbai	Crime Branch arrests	5 kg	Depleted uranium	Case following internal exposure incidents
2016	Thane, Maharashtra	Seizure from private individuals	9 kg	Depleted uranium	Civilian possession of a nuclear substance
2018	Kolkata	Uranium smuggling ring busted	1 kg	Uranium	Valued at $440,000; involved domestic and foreign buyers
2021	Maharashtra	Two men arrested	7.1 kg	Natural uranium	Valued at $2.8 million; suspects linked to strategic organizations
2024	Bihar	Arrest of three individuals	50 g	Californium	Valued at ~$101 million; traced back to BARC

2024	Dehradun	Five individuals arrested with a radioactive device, black boxes	250 kg	black boxes resembled those typically used for transporting radioactive materials	black boxes capture and are linked to the Bhabha Atomic Energy Center in Mumbai (BARC).

Source: ***Data compiled from Multiple Open Sources***

3. Key Actors and Networks enabling the Nuclear Black Market in India's

India's rise as a nuclear-armed state has positioned it as a key strategic player in South Asia and beyond. However, over the past three decades, a consistent pattern of nuclear thefts, illicit material transfers, and security breaches has underscored the presence of a functioning nuclear black market in India. The highly dangerous feature of India's nuclear black market is the role of an insider (Noor Sitara, 2022). Individuals with authorized access to nuclear materials or facilities who have either directly facilitated theft or have been complicit through negligence or active involvement.

3.1 Insider Involvement and Institutional Breaches/Access

The involvement of insiders is one of the most critical and consistent catalysts enabling the nuclear black-market activities in India. Data of various incidents, notably the 2000 Bibi Cancer Hospital, in which radioactive components reached scrap dealers and 2009 radioactive poisoning case at a nuclear facility (Mahmood et al., 2016), in addition to the 2024 Dehradun theft of black boxes linked to BARC[1], indicates that individuals with direct institutional access have been the root cause of major security breaches. Such inside agents take advantage of poor internal monitoring, as well as poor vetting procedures. This also implies that insiders are working under a mechanism that condones such negligence. This also raises concerns about systemic access lapses.

3.2 Political Actors and Organized Smuggling Networks

The nuclear black market in India is not limited to rogue individuals only. It includes organized criminal networks and political actors. The 1998 West Bengal incident, linked to a politician in 100 kg of uranium theft (Gargi M, 2003), highlights a dangerous convergence of political access and nuclear black-market activities. A public official attempts to transport and distribute a large quantity of fissile material, which shows the penetration of criminal interests into the political domain. The subsequent arrests of ten more individuals and seizure of additional uranium in the same case suggest not a one-time breach but the existence of a coordinated smuggling ring.

The 2018 uranium seizure case of Kolkata, valued at $440,000, is another example of an organized Smuggling network (Dwaipyan Ghosh, 2018). Furthermore, the sez of high-value materials like Californium in 2024 in Bihar, valued at ~$101 million(Mahmood et al., 2016) and 250 kg of radioactive containers (2024, Dehradun), are highly specialized materials and are likely to attract interest from well-financed, organized actors. This reveals the presence of both local and international buyers and highlights the transnational dimension of India's nuclear black market.

Pattern of Incidents

Pattern	Examples
Recurring Insider Breaches	2009 poisoning at nuclear facility; 2024 Dehradun black boxes with BARC label
Civilian Possession of Material	2000 & 2009 uranium seizures from scrap dealers in Mumbai
Political Involvement	1998 West Bengal case: politician found with >100 kg uranium
Geographic Clustering	Repeated incidents in Maharashtra, Bihar, and West Bengal
Transport-Phase Vulnerability	2006 container theft; 2021 and 2024 seizures during smuggling
Cross-Border Smuggling	2003 near the Bangladesh border; 2008 Supaul near the Nepal border
Post-2008 Incident Surge	Rise in high-volume thefts after the India–US nuclear deal and NSG waiver.
Use of Medical Sector Loopholes	2000 Bibi Cancer Hospital denial, then admission of radioactive waste sale

Source: ***Data compiled from Multiple Open Sources***

3.3 Civilian and Informal Actors

Another complicated side of the nuclear black market in India is the role played by scrap dealers, unaffiliated civilians, and other individuals who do not operate through any official or regulated channels and who have access to radioactive materials. Several instances of nuclear thefts, such as those (2000, 2009)(Akmal Haris, 2021), where radioactive materials were discovered in the hands of civilians, indicate that these players take advantage of loose and informal institutional disposal procedures and practices. In addition, the presence of radioactive materials in the open market indicates a lack of accountability, where second parties emerge to be the critical avenues of transferring the black-market materials.

4. Systemic Vulnerabilities in India's Nuclear Security

4.1 Inadequate Physical Protection and Facility Access

Despite India's declared focus on physical security infrastructure, featuring surveillance, fencing and access control, major incidents continue to occur at its sensitive nuclear sites. The theft of radioactive material from a fortified facility in 2006 and again in 2024, the theft of sealed containers associated with BARC demonstrates that physical safeguards are either obsolete, highly permeable, or inconsistently enforced(Levy Adrian Smith Jeffrey. R, 2015). Such accidents reveal the serious discrepancy between real operating capability and security procedures proclaimed. The non-uniformity in implementing transportation security as prescribed in IAEA INFCIRC/225/Rev.5 leaves high exposure windows that are routinely exploited(IAEA, 2011). It also contributes to thefts during transportation, compounded by the lack of GPS and armored convoys, and secure packaging.

4.2 Manual Inventory and Tracking Systems

Another fundamental weakness in the security of nuclear facilities in India is the manual inventory systems still in use in different facilities. Indian nuclear security is also lacking a strong Material Control and Accounting (MCA) system, as suggested by the IAEA(IAEA, 1980). This implies that unauthorized diversion can go undetected over an extended period. Considering the history of thefts and seizures of nuclear material, the failure of nuclear institutions to proactively identify missing material before it reaches the black market is evident.

4.3 Regulatory and Oversight Deficiencies

India's nuclear oversight structure is flawed by an inherent conflict of interest. The Atomic Energy Regulatory Board (AERB) operates

under the administrative control of the Department of Atomic Energy (DAE). Which is the same body it is supposed to regulate. This arrangement weakens regulatory independence and prevents effective implementation of safety and transparency standards. The 1998 IGCAR uranium misclassification case in Tamil Nadu. In which 8 kg of material initially tested as enriched uranium was later downgraded to 'limonite' by IGCAR(Mazari & Sultan, 1014). This demonstrates how regulatory bodies can be used to obscure or dilute serious security findings. The lack of a centralized tracking mechanism for radioactive material across sectors and regions is another vulnerability. This means that material can easily fall through the cracks of fragmented jurisdictional controls, and this is evident by the dispersal of radioactive components to scrap dealers and civilians.

4.4 Personnel Vetting and Insider Monitoring Gaps

The 2024 black boxes, container theft involving BARC-labeled and the 2009 insider poisoning case highlight the failure of existing check protocols. This includes internal behavior monitoring and response mechanisms. The lack of accountability for such frequent incidents shows the vulnerability and weakness of the internal governance mechanisms.

4.5 Transportation and Border Control Vulnerability

With repeated thefts, transportation remains a chronic vulnerability in India's nuclear safety and security (Kanwal Gurmeet, 2001). The 2006 container theft, 2008 Supaul seizure, and 2021 and 2024 large-quantity uranium smuggling incidents all highlight the transportation vulnerabilities. As well, border region incidents near Bangladesh expose how porous borders and regional trafficking networks facilitate the cross-border movement of radioactive materials. The persistence of India's nuclear black market, which is evident by decades of documented illicit trafficking, thefts and insider-led breaches, is not simply due to institutional weakness only. It is driven by complex geopolitical dynamics and technological gaps. These factors have collectively worsened vulnerabilities in the safeguards, oversight, and infrastructure to frequent violations. The following section critically examines these drivers.

5. Geopolitical and Technological Factors and India's Nuclear Black Market

5.1 India's Non-Signatory Status to the Nuclear Non-Proliferation Treaty (NPT)

India's non-signatory status to the Nuclear Non-Proliferation Treaty (NPT) primarily limits the scope of international nuclear oversight. This complicates global efforts in safeguarding nuclear infrastructure under the full scope of the International Atomic Energy Agency (IAEA). This also restricts the IAEA's full inspections, weakening the transparency of material tracking and compliance(Carlson, 1018). This has resulted in a regulatory vacuum, which has been exploited repeatedly. From 1994 to 2024, more than 20 confirmed incidents of nuclear theft and smuggling were documented in India. These incidents underscore the inability of India's internal institutions to prevent and report nuclear material diversion in the absence of binding international responsibility.

5.2 Strategic Trade-offs: NSG Waiver and the 2008 India–US Civil Nuclear Agreement

The 2008 India-US Civil Nuclear Agreement enables India to access global civilian nuclear markets despite its non-NPT status. As a result, the Nuclear Suppliers Group (NSG) granted India a waiver. This allows India for nuclear trade without having its nuclear facilities under the IAEA's monitoring (Bajoria & Pan Esther, 2010). This strategic accommodation, which is driven by global geopolitical realignment, is at the cost of dangerous nuclear material security. The waiver is facilitating the expansion of India's nuclear footprint without implementing international safety standards (Altaf, 2017). The impact of prioritizing geopolitical goals over robust security oversight is evident in the form of frequent and continued nuclear material thefts, contributing to the black market' persistence. The incidents of nuclear

material thefts and volume of material in circulation have grown after the post-waiver, without the essential regulatory and tracking reforms.

Pre and Post Waiver Incidents

Time Period	Number of Documented Incidents	Materials Involved	Notable Patterns	Representative Incidents
1994–2007 (Pre-Waiver)	**7 incidents**	Uranium (natural, semi-processed), radioactive isotopes	Mostly localized; insider negligence; small-scale unauthorized civilian possession	1994 Meghalaya (2.5 kg uranium) 1998 Tamil Nadu (8 kg) 2000 Mumbai (25 kg uranium) 2003 Bangladesh border (225g milled uranium)
2008–2024 (Post-Waiver)	**10 incidents**	Depleted uranium, Californium, sealed radiographic devices, uranium	Increased value & toxicity; insider facilitation; cross-border trafficking; link to strategic centers	2008 Supaul (4 kg uranium) 2009 Mumbai (5 kg DU) 2016 Thane (9 kg DU) 2021 Maharashtra (7.1 kg uranium) 2024 Bihar (50g Californium) 2024 Dehradun (250 kg containers)

Source: *Data compiled from Multiple Open Sources*

5.3 Technological Gaps in Security Infrastructure

India's nuclear safety framework remains technologically underdeveloped. Poor inventory reconciliation across nuclear, manual tracking and insufficient surveillance integration in medical and industrial sectors are creating blind spots and enabling unauthorized access and material loss(Jaffar, 2024). India has not implemented advanced tracking technologies, including radio-frequency identification (RFID) and blockchain-based ledger systems, for monitoring of nuclear material. This allows diversions to go undetected, particularly within dual-use facilities and during transportation. The 2006 theft of a container from a fortified research facility, and the cross-border smuggling incidents, including Supaul (2008), West Bengal (2003) and Bihar (2008) highlight this vulnerability.

5.4 Cybersecurity and Emerging Technological Threats

India also faces growing exposure to cyber threats. In 2019, a malware attack targeted the Kudankulam Nuclear Power Plant (The Hindu, 2021). The incident serves as a stark reminder of the potential dangers of cyberattacks on critical infrastructure. The IAEA has warned that these technologies can be exploited to produce untraceable components for nuclear use. India's current regulatory system lacks dedicated oversight of such emerging threats. The need for robust cybersecurity measures and transparency in reporting incidents. These geopolitical and technological dimensions provide a structural lens through which to interpret the recurrence and persistence of nuclear black-market activity in India. The institutional weaknesses, unregulated growth, political trade-offs and technological lag have created a security environment in which radioactive materials routinely escape state control(Jaffar, 2024). A worldwide transparency in reporting incidents

and a comprehensive monitoring of the IAEA is pertinent. Otherwise, India's nuclear vulnerabilities will continue to pose risks to its national security and the security of other countries in the region, along with international non-proliferation regimes.

6. Regional Dynamics and Global Security Implications

The nuclear black market in India, which is clearly indicated with frequent incidents of insider breach, thefts and cross-border smuggling, has far-reaching implications on both regional stability in South Asia and global nuclear security frameworks. Such implications arise out of reported diversion of material, systemic vulnerabilities, and regulatory failures. Such risks of multidimensional failures have direct impacts on non-proliferation norms, regional balances and transnational security regimes(Mehmood, 2025).

6.1 Regional Security in South Asia

The repeated theft of nuclear substances in India, including uranium and Californium, raises concerns of it falling in the hands of non-state actors or terrorist groups. The seizure of uranium along the Bangladesh border in 2003 and the Supaul case along the India-Nepal border in 2008 serve as evidence of the regional permeability of this threat. On the one hand, the risk of nuclear or radiological material getting in the possession of extremist groups poses a danger to domestic security and on the other hand, may result in triggering preventive measures in neighboring countries. It might also affect nuclear deterrence stability and accidental escalation during a crisis (Khan A, 2022). Further, the role of political actors and organized smuggling networks in illicit nuclear trade in India is likely to fuel volatility. This also calls into question India's credibility as a responsible nuclear power and jeopardizes trust in nuclear confidence-building measures in the region.

6.2 Erosion of Global Non-Proliferation Norms

The fact that India has partially joined the International Atomic Energy Agency (IAEA) safeguards has caused a regulatory gap. It is not only in weakening the nuclear security of India, but also in that of the entire global nuclear governance framework(Jaffar, 2024). Even today, India has not declared all its nuclear facilities to IAEA inspectors. Despite gaining access to the international civilian nuclear market through the 2008 NSG waiver and the India–US Civil Nuclear Agreement. This discriminatory oversight has weakened the global non-proliferation norms (Sohail, 2025). It is also creating a precedent that strategic interests can dominate regulatory compliance even in nuclear security regimes. The documented more than 20 incidents of nuclear theft and smuggling in India, not only highlights the gaps in Indian safety and security but also challenges the credibility of the NSG and the IAEA. It also raises concerns about its commitment to global norms and the selective international oversight.

6.3 Limited Transparency and Global Accountability and Trust

The AIEA has various databases that include the Incident and Trafficking Database (ITDB). The ITDB database predominantly tracks illicit activities that involve radioactive material and cases of illicit trafficking. The past events show India's limited engagement with these databases and transparency in reporting different incidents. In addition, India's refusal of IAEA access to all its facilities for inspection is a major inconsistency in transparency. This refusal to international scrutiny prevents the exact assessment of risks and does not allow the accurate evaluation of risks (Carlson, 2015). This weakens the global trust and confidence building as well as undermines multilateral and international institutions in a strategic response planning to new threats and minimizes the chances of cooperative security enhancement. The 2020 Nuclear Threat Initiative (NTI) ranking has placed India is at 20th position out of 22 states (INDEX, 2020). Furthermore, the country scores low in areas like risk reduction ability and a culture of security, oversight weaknesses have implications far beyond India. These vulnerabilities are not only undermining the nuclear arms control regimes and global

nuclear risk reductions but they are also complicating the current security environment.

7. Conclusion

The documented incidences of nuclear and radioactive material theft in India in the period between 1994 and 2024 indicate systemic and persistent security failures. Despite, being a responsible nuclear power with an international reputation, India's nuclear infrastructure remains vulnerable and weak. This includes insider involvement, poor inventory monitoring, and inadequate physical security protections. This has enabled the growth of a functioning nuclear black market that has included political actors, organized smuggling networks, and global consumers. India's non-adherence to the NPT and the strategic leeway granted through the 2008 NSG waiver have limited external accountability and contributed to a rise in post-waiver theft incidents. The absence of comprehensive IAEA oversight and continued underreporting of nuclear security breaches further undermines global non-proliferation efforts.

The regional and international consequences are dire. The porous borders increase the risk of radioactive materials reaching militant groups. This could destabilize South Asian security and erode trust in global nuclear governance. India's frequent breaches challenge the credibility of institutions such as the NSG and the IAEA, while signaling that strategic interests have taken precedence over international safety standards and norms. To mitigate the risks, India must implement robust material accounting systems, strengthen independent regulatory mechanisms, enforce strict personnel vetting, and enhance transparency in reporting. Without sweeping institutional reforms and full alignment with global nuclear security standards, the threats posed by India's nuclear black market will continue to endanger both regional and global security architectures.

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