

ENVIRYA

PROTECTED INFRASTRUCTURE FOR HIGH-THREAT ENVIRONMENTS

CBRN Threat Primer

Chemical · Biological · Radiological · Nuclear
and Electromagnetic (EMP / IEMI / TEMPEST) hazards

An educational reference by Envirya Projects Pvt. Ltd.

Threat data compiled from open sources. Not classified. www.envirya.in

WHY THIS MATTERS

Understanding the CBRN threat spectrum

CBRN threats combine the **intent** and the **capability** to employ weapons or improvised devices that produce chemical, biological, radiological or nuclear hazards. Hazards may arise from deliberate attack or accidental release — of toxic industrial materials, chemical or biological agents, or radioactive material — including the effects of weapons of mass destruction. Hostile state and non-state actors, including terrorists, continue to seek such capabilities to cause mass casualties and destabilisation. Elaborate, layered and validated protective measures are therefore essential to minimise vulnerability to, and the effects of, CBRN contamination.

This primer is a concise, open-source reference to the threat landscape Envirya's protected-infrastructure solutions are engineered to counter.

CHEMICAL

Chemical agents act rapidly and are grouped by physiological effect. Envirya shelters counter them through gas-tight construction, filtration and automated decontamination.

Agent class	Key symptoms	Effect & action	Release form
Nerve (Sarin, Soman, Tabun, VX)	Difficulty breathing, sweating, drooling, convulsions, dimmed vision	Incapacitates at low dose; death at high dose. Very rapid by inhalation / eyes	Aerosol, vapour, liquid
Blood / choking (Chlorine, Phosgene, Cyanides)	Difficulty breathing, coma	Interferes with respiration and cellular oxygen transport. Rapid	Aerosol, vapour
Blister (Mustard, Lewisite, Phosgene oxime)	Searing eyes, skin stinging, blistering	Blisters skin and respiratory tract; possible temporary blindness. Immediate to delayed	Liquid, particulate
Incapacitating / riot (Adamsite, CS, pepper)	Irritation, vomiting, disorientation	Temporary incapacitation	Aerosol, vapour

BIOLOGICAL

Biological agents span bacteria, viruses and toxins with widely varying transmissibility. Detection, filtration and Silent-Threat readiness frameworks address covert release.

Agent	Untreated mortality	Incubation	Human-to-human
Anthrax (Bacillus anthracis)	Skin 5–20% · Respiratory 80–90%	1–4 days	No
Plague (Yersinia pestis)	~60%	2–3 days	High
Q Fever (Coxiella burnetii)	<1%	2–10 days	No
Tularemia (Francisella tularensis)	30–50%	2–10 days	No
Smallpox (Variola major)	~30%	10–12 days	High
Viral haemorrhagic fevers (Ebola, Marburg, Lassa)	Up to 90% (virus dependent)	3–21 days	Moderate
Botulism (Botulinum neurotoxins)	~60%	1–4 days	No
Ricin (Ricinus communis)	~30%	Hours to days	No

RADIOLOGICAL

Radiation damages the body primarily through DNA — directly by breaking bonds, or indirectly via free radicals from broken water molecules. A damaged cell may repair itself, mutate (a pathway to cancer), or die; widespread cell death from high doses leads to organ failure. Acute symptoms include loss of appetite, fatigue, fever, nausea, vomiting, diarrhoea and, at high doses, seizures, coma and skin damage. Illness may persist from hours to months.

NUCLEAR — BURST TYPES & EFFECTS

Flash & fireball	Intense blinding flash and heat in under a millionth of a second; gas to plasma at over a million degrees. ~100% lethality near the fireball; sets up flash blindness, mass fires, deep burns and lethal radiation.
Blast	Static overpressure from compression plus dynamic overpressure from drag/wind; spherical expanding wave. Overpressure 2–8× the incident wave; equipment and personnel vulnerable to dynamic overpressure.
Shock	Air-blast loading creates a super-seismic condition; ground shock via air-slap, direct, and head waves. Surface burst produces maximum shock — a 1 kT surface detonation can destroy underground facilities tens of metres deep.
Thermal	Greatest for low-altitude bursts; ~99% of thermal energy in the second peak. Causes flash and flame burns, eye injuries and ignition of combustibles; flash blindness for 2–3 min (day) to 10–15 min (night).
Radiation	Initial radiation within the first minute from detonation; residual radiation (fallout, neutron-induced) after. Hazard from exposure or contamination — affected by distance, time, dose and dose rate.

ELECTROMAGNETIC — EMP, IEMI & TREE

Electromagnetic pulse propagates through both conducted and radiated forms and couples into any electronic system, cable or component as a function of signal frequency and receptor dimension. The EMP spectrum carries significant amplitude up to ~250 MHz — any system operating in that range is at risk. Major receptors include long power lines, HF/VHF and microwave communications, buried cables, long-wire antennas, naval systems and airborne platforms. Induced transient voltages and currents cause functional upset or permanent burnout of semiconductors and integrated circuits. TREE (Transient Radiation Effects on Electronics), from fast neutrons and gamma rays, causes fadeout and burnout of sensitive electronics.

E1 pulse	Nanoseconds to microseconds; ~50 kV/m for HEMP, MV/m at source. The fast, damaging spike.
E2 pulse	Microseconds to milliseconds; comparable to lightning-induced transients.
E3 pulse	Seconds to ~1000 seconds; slow, geomagnetic-storm-like component affecting long conductors and power infrastructure.

HOW ENVIRYA COUNTERS THESE THREATS

Envirya delivers turnkey protected infrastructure engineered against this full spectrum: CBRN defence shelters (blast-proof, gas-tight, with filtration and automated decontamination); the Silent Room® shielded enclosure for EMP/IEMI/TEMPEST and acoustic protection; EMP hardening of critical assets including the patent-filed E3 HEMP/EMP protector; and the world's first commercially available EMP/IEMI data-line filter. Performance is validated in-house to MIL-standard requirements and independently certified.

To arrange a briefing or a guided visit to our Gurgaon demonstration facility, contact contactus@envirya.in · www.envirya.in