

How illegal arms can be traced

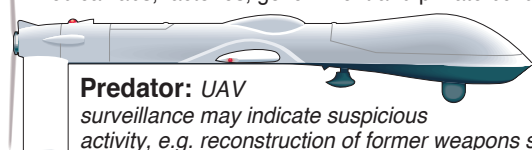
Detecting weapons of mass destruction (WMD)

Inspectors will rely on human intelligence backed up by powerful new methods of verification to determine the presence of a WMD programme

Team: 270 inspectors from 48 countries, 100 on duty at a time.

Targets: 100 priority sites. Over 1,000 other sites including medical labs, factories, government and private buildings

New powers: Unrestricted inspection rights to formerly-exempt sites, removing suspect material when necessary

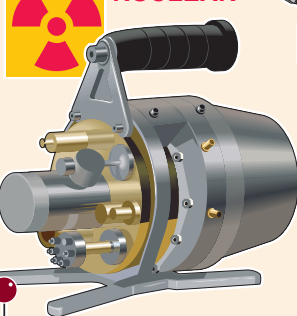


Predator: UAV

surveillance may indicate suspicious activity, e.g. reconstruction of former weapons sites



NUCLEAR



Hand-held radiation probes

To search for and identify quantity and type of radioactive material

Ranger: Gamma and neutron detector

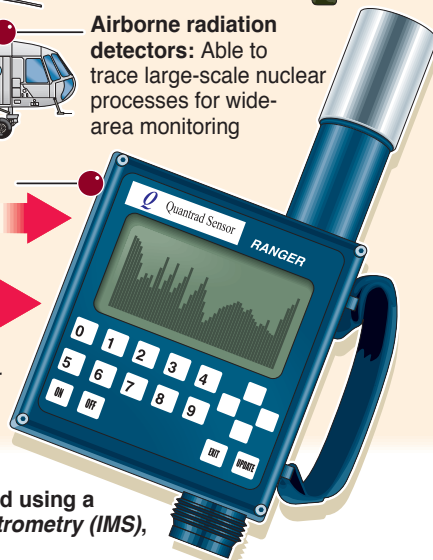
Gamma rays: Strike **sodium iodide** crystal, generating charge – pattern identifies radioactive isotope

Neutron detector: Neutrons from uranium or plutonium pass into high-pressure **helium-3** isotope, generating electrical charge

Irradiated fuel monitors: Ensure nuclear reactor fuel has not been diverted for military use

Airborne radiation detectors:

Able to trace large-scale nuclear processes for wide-area monitoring



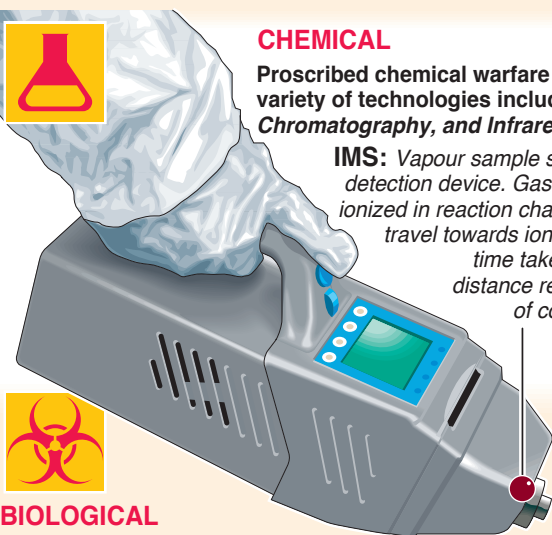
CHEMICAL

Proscribed chemical warfare agents can be detected using a variety of technologies including **Ion Mobility Spectrometry (IMS)**, **Chromatography**, and **Infrared Spectroscopy**

IMS: Vapour sample sucked into detection device. Gas molecules ionized in reaction chamber. Ions travel towards ion detector – time taken to travel distance reveals type of contaminant

Trace particles

Many substances do not have a strong vapour presence. Most reliable analysis method may be particle collection or chemical detection paper

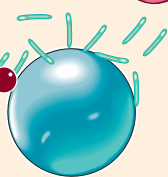
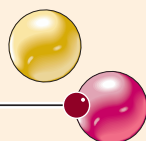


BIOLOGICAL

Detectors use **flow cytometry** and **Polymerase Chain Reaction (PCR)** technology to identify biohazards

Flow cytometry: Small "capture beads" – colour-coded according to antibodies with which they are coated – exposed to air sample

Pathogen in air sticks to specific antibody. Additional fluorescent-dyed antibodies introduced – these attach to and reveal pathogen



Hanaa: Hand-held Advanced Nucleic-Acid Analyser

Uses PCR to amplify DNA of up to four samples simultaneously

Aqueous sample inserted into thermocycling unit

Sample repeatedly heated close to boiling then cooled. DNA duplicates in each 30-second cycle.

Fluorescent DNA-probe – designed to attach to specific pathogen – inserted to reveal presence of agent

