

Single- or Multi-purpose: While most process sensors are likely to be single-purpose instruments, analytical chemical instruments may vary widely. Chemical detectors sensitive only to certain nerve agents may be utilized, for example, to warn inspectors of leaking munitions or bulk storage containers. To detect and distinguish between the wide variety of CW agents, key precursors, and other lethal chemicals, on the other hand, it probably will require analytical instrumentation with very broad capabilities.

Operator sophistication required: Advanced analytical instruments often are used only by highly trained chemists, while chemical warning detectors are issued to entry-level military personnel. Similarly, certain data recording and analysis equipment requires considerable operator skill, while other applications can be satisfied with simple recording devices no more complex than elementary audio tape recorders used by today's teenagers. Inspectors must be trained professionals capable of fulfilling this wide variety of tasks.

Susceptibility to circumvention: Chemical analytical techniques may be spoofed by sprinkling related compounds around to mask traces of illicit materials or to produce large numbers of what later are seen to be false alarms. In addition, careful clean-up efforts may further reduce even trace amounts of chemicals. Setting up parallel process streams, or even relatively small piping sections thereof, also could circumvent process monitors, for example. Careful design of monitoring systems may complicate such attempts, however--perhaps by incorporating multi-phenomenology sensor packages, etc.

Reliability: Certain provisions of the CW Convention may be monitored by the use of sensors which of necessity must operate reliably for periods of weeks or perhaps months at a time. Other monitoring devices that may have human operators will have to be quite reliable as well, to avoid frequent and costly maintenance requirements. A critical aspect of each instrument is that its mean-time-between-failure (MTBF) is kept appropriately low, and that it be further minimized by a scheduled preventive maintenance program. Such sensors must operate reliably as a system as well.