

The objective of process monitoring for verification purposes differs from that of production. In verification the objective is to provide confidence that prohibited activities are not undertaken. The aim e.g. in permitted schedule 2 e production is to verify that quantities produced are consistent with the needs not prohibited by the Convention, that no Schedule 2 chemicals are being diverted to illegal purposes, and that no Schedule 1 chemicals are being produced.

From the process monitoring side information for verification of the production quantity may be obtained by monitoring flow or weight. Accurate instruments for those purposes are available, but they may not suffice alone for verification.

Verification of non-production of prohibited chemicals can be achieved in two ways. First, by monitoring many physical variables simultaneously to get a signature of the process, or by incorporating composition indicating instruments in-line with the production equipment. At present near infrared (NIR) spectrometry with fiber-optics seems to be the one of the promising in-line analyzers. It gives a fingerprint on every chemical. The drawback is the need for frequent maintenance, lack of library spectra and tools for data evaluation. On-line analyzers, e.g. those based on chromatography are too prone to malfunctions in the absence of maintenance personnel. The greatest problem with this type of process monitoring is the potential loss of confidential business information, unless the instruments are specially designed to limit the information extracted from this type of monitoring.

Another approach to the verification of non-production is continuous sampling and analysis of the samples later during on-site inspections. This method could be combined with continuous monitoring of flow for quantity determination. To be reliable, continuous sampling requires stability of components from the time of sampletaking up to analysis. This requirement has been shown to be fulfilled with a prototype of a sampling equipment where the sample is inserted onto a magnetic tape. During inspection, the sample can be desorbed by heating the tape and the vaporized chemicals analyzed with a mass spectrometer.

This technique preserves the confidentiality, if the memory of the mass spectrometer includes only those chemicals under the Convention, as it does not identify other production, thus protecting confidential business information.