

4. One of the several methods proposed for verification of production and stockpiling of CW agents and for testing their use on field is on-site inspection, including sample collection and trace analysis. Unfortunately, it is quite intrusive and serves, therefore, best as the last step of a complete multistep verification procedure (as proposed in some recent working papers). International verification becomes meaningful only if the chemical identity of all agents and related compounds found is fully elucidated. True, it may be possible to verify non-production of supertoxic nerve agents just by observing the absence of special safety constructions, but the non-production of only slightly toxic components of binary weapons is not that straightforward. From the binary components sample collection and analysis may be the only fully reliable verification method. Ultrasensitive off-site monitoring of air and water for agent traces is still another potential application of the verification method based on the analysis of samples.
5. Sample collection and trace analysis are equally useful for the verification of alleged use in combat of chemical weapons. Armies use on battlefield simple test sets like colour indicator papers which are neither very sensitive nor quite specific. If verification has to be carried out from outside the battlefield or even on it but a longer time after the alleged use, a more effective method has to be used.
6. The first step of the Finnish project was to synthesize model nerve agents and related chemical compounds, and examine their relevant properties with respect to possible verification analyses. After that, the suitability of available instrumental techniques for the identification of CW agents was studied. By using the most suitable techniques, and selected repeatable measuring conditions, an initial data base was recorded for about 150 agents and their degradation products. The selected techniques were arranged in the form of a system of microanalytical methods, and this system was proposed for consideration as a basis of international standardization of CW-verification analysis. The proposed system was published by the Ministry for Foreign Affairs of Finland in 1978 and 1980 in the form of handbooks referred to above (CCD/577 and CD/103).
7. The Finnish project has also trained several research workers in the field of CW verification analysis. The head laboratory of the project is located at the Department of Chemistry of the University of Helsinki but the research is carried out in close co-operation with several other Finnish laboratories.
8. The primary goal of the first phase of the Finnish project was reached in summer 1980. It was a sensitive identification system for the most important supertoxic agents. The goal of the next phase is the development of detailed procedures for sample preparation and quantitative organic determination on the trace level of known and potential agents. Accurate methods are necessary for obtaining useful information also on complex and metabolized sample matrices. Parallely to these studies the Finnish project concentrates on the automation of the verification analysis including the development of automatic monitoring instrumentation. Automated verification analysis makes possible sensitive monitoring of the prohibited chemicals alone decreasing the fear of revealing commercial and industrial secrets from industrial samples by unnecessary revelation of other, peaceful compounds. The third future goal is the extension of the original data base to any chemical compound relevant to a CW ban.