

contents. This, however, remains to be demonstrated and will require computer-based advanced signal processing and data analysis techniques.

13. In contrast to X-ray examination the state of the art on ultra-sonics for the support of CWC initiated inspection/verification regimes is less advanced; more research is therefore required before prototype instruments can be designed and constructed.

14. The detailed concept of use and roles for ultra-sonic and X-ray instruments will be very similar; the same basic data should cover both types of instruments.

15. Discussions to date indicate that an ultra-sonic probe designed to support CWC on-site inspections, together with its power source and signal processing/data analysis accessories, will be readily transportable and may possibly be man-portable.

#### Neutron Activation Analysis

16. This technique cannot give precise structural chemical information but would be able to provide detailed information on the atomic nuclei which are present within a container. The presence of elements such as phosphorus and fluorine (nerve agents), sulphur and chlorine (mustard agent), arsenic (Lewisite) in significant amounts may indicate the presence of compounds which are of particular relevance to a CWC.

17. A number of aspects of this technique require further investigation. For example it is not certain whether the atomic nuclei of particular interest to a CWC can be effectively probed if they are screened by materials which are typically encountered in munitions casings and as storage containers; it may be difficult to recover sufficient gamma ray energy from the activated nuclei through the material of the container. A more complete assessment of the utility of this promising technique for verification purposes requires experimentally based studies.

18. It is clear that neutron activation analysis requires advanced signal and data processing as integral design components. Such components are also likely to enable the technique to generate ratios of selected elements of CW interest, a possibility already noted in CD/CW/WP255. This information, although not as conclusive as analysis of a sample by NMR or IR methods will be as definite as any non-intrusive method can be in evaluating whether the contents of a sealed container are of potential CWC interest.

19. A neutron activation analysis instrument designed specifically for the support of on-site inspections will be transportable but it is doubtful that it will be man-portable. The shielding and power requirements are not now anticipated to exercise such serious constraints as was at one time expected.

20. The need to define precisely the roles and concepts of use, under the inspection regimes of the CWC, for non-intrusive analytical techniques apply equally to neutron activation analysis. Once this and the relevant performance characteristics have been defined design and construction of a prototype instrument intended specifically for CWC use could probably quickly follow completion of the studies referred to above.