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LETTER DATED 12 AUGUST 1992 FROM THE REPRESENTATIVE OF THE UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND ADDRESSED TO THE SECRETARY-GENERAL OF THE CONFERENCE ON DISARMAMENT TRANSMITTING A PAPER WHICH ADDRESSES THE REQUIREMENTS FOR SAFETY DURING THE ON-SITE INSPECTIONS PROVIDED FOR UNDER THE CHEMICAL WEAPONS CONVENTION

I have the honour to transmit a paper prepared by the United Kingdom, which addresses the requirements for safety during the on-site inspections provided for under the Chemical Weapons Convention.

I believe this topic is of relevance to the future work of the Preparatory Commission for the Organization for the Prohibition of Chemical Weapons and I should be grateful if you would arrange for the paper to be circulated as an official document of the Conference on Disarmament.

(Signed) Sir Michael Weston KCMG, CVO
Ambassador
Leader of the Delegation of the United Kingdom of Great Britain and Northern Ireland to the Conference on Disarmament

UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND

The Chemical Weapons Convention: Safety Rules for Inspections

INTRODUCTION

1. Little consideration has been given so far to safety issues during the conduct of inspections to be undertaken under the Chemical Weapons Convention (CWC). But, with the early conclusion of the Convention now expected, it is important that some attention is devoted to this aspect of its implementation.

2. A principal task of the Preparatory Commission will be to carry out the necessary preparations for the effective operation of the Chemical Weapons Convention. The Commission will be tasked in particular to consider recruitment and training of technical personnel, standardization and purchase of equipment and to prepare guidelines for initial inspections. The United Kingdom believes that safety issues must be an essential element in these preparations. Much has been learned about safety issues during the various national practice challenge inspection programmes and during the United Nations Special Commission inspections of chemical weapon production and storage sites. This working paper addresses the safety question by producing an initial assessment of the safety issues derived from United Kingdom involvement in these experiences. It also offers a preliminary set of guidelines (Appendices 1-4) on safety issues for consideration by the Preparatory Commission.

General safety policy

3. One of the first tasks confronting the Technical Secretariat (TS) will be the need to identify minimum safety standards. If local safety standards are higher, the host State should provide either the necessary resources to achieve them or to waive them during the inspection and apply the agreed minimum standards. Thereafter the TS will need continually to assess the safety standards of all States parties and to update its own procedures in line with current good practice.

4. The responsibility for the safety of inspectors lies with the TS and with the Chief Inspector (CI) on site. The CI may be assisted and advised by a Safety Officer (SO) who should be responsible for all aspects of safety and ensuring that guidelines are properly interpreted in the light of prevailing conditions. Safety measures will be strongly site specific and the SO will need to be aware that an obstructive inspected State party might misuse safety restrictions to delay or hinder inspections.

5. In order to satisfactorily address safety issues during inspections the TS might require its own Safety Group (SG). Although this SG would need to be colocated, and work closely with, the TS it is important that it should have the freedom to act independently; it should be able to report directly to the Director-General. In the same way, individual safety officers provided by the SG to accompany large inspection teams must have the authority to report directly to the SG should there be a disagreement over an important

safety matter. (Small teams will probably not justify a full time SO and one of the other specialists will need to be briefed to fulfil this role.) This would apply especially during the planning phase of munition/agent/plant destruction inspections.

6. In practice the SO will assess the various hazards and the risks involved in carrying out the inspection in different ways and produce a balanced judgement on how the work should be done. He will make this judgement in consultation with the CI, and others whilst considering the operational implications. A fault frequently observed is a superb set of instructions laxly implemented. A major task for the SO will be to ensure that the safety rules are enforced.

<u>Safety organization</u>

7. The extent to which inspection teams will require a formal structure, consisting of specialized subgroups, will depend largely on the size of the teams. For large teams, consisting of ten or more inspectors, such a structure will be necessary in order to achieve the highest possible operational efficiency. But whether a formal organizational structure is required or not, safety must be a main principle of all operations.

8. An appropriate organization might be based on the formation of three sub-teams:

(a) a Control Group (CG).

(b) a Safety/Reconnaissance/Contamination Control Group (SRCCG), and

(c) a Reporting Group (RG) to carry out the actual inspection, to record and to collect samples.

This basic organization based upon UNSCOM experience is necessary where extremely hazardous conditions are likely to be encountered. However, at most sites reconnaissance and contamination control will not be required and the SO might report directly to the CG.

9. One of the main tasks of the SO is hazard and risk assessment. Some relevant information can be obtained from the host officials on arrival at the site, but it may vary in quantity and reliability and may possibly be misleading. The wise SO, therefore, will receive any such provided information pertaining to safety but not risk his inspectors until he has carried out a sufficiently detailed reconnaissance to satisfy himself that they will not be put at risk.

<u>Conduct of the inspection</u>

10. Initial inspections and Challenge Inspections at especially hazardous sites should be conducted according to strict guidelines. These might be:

(a) a general reconnaissance of the site by surface vehicle or helicopter to identify the main areas to be inspected and if possible, to identify more or less hazardous areas.

(b) a detailed reconnaissance of the site, or sections of the site, as necessary. This may be extremely dangerous and the SO will have to use whatever appropriate means of protection are available and suggest deploying inspectors in such a way so as to minimize the risk. In some cases the SO may decide that inspectors should not enter at all and that other means of inspection be utilized.

(c) carrying out the reporting part of the inspection. In hazardous situations the risk can be minimized, by limiting the number of inspectors, or eliminated entirely, by relying only on the reports of the reconnaissance team.

In most cases a sufficiently detailed reconnaissance can be done during the initial overview of the site, supported if necessary by a quick look at particular areas by the SO.

General safety

11. Experts intent on pursuing their specialization can be single-minded to the point of endangering personal safety. This can be very important during inspections in unfamiliar surroundings, when even common sense precautions such as personal protection from extreme climatic conditions can be neglected.

12. Inspectors need to recognize that they are responsible for their own safety. They should comply with advice from the SO at all times. At hazardous sites especially, inspectors must remain constantly aware of their personal environment and, in the absence of direct instructions from the SO, apply common sense precautions. Inspectors should also look out for the safety of other team members who may not notice a hazard while engrossed in their own job. An inspector that becomes a casualty through lack of common sense precautions, not only becomes incapable of doing his own job, but becomes a burden on the rest of the team.

13. Suitable clothing, including strong boots, should be worn during inspections together with any specialist protective equipment required. This will vary, depending on both the location and type of inspection site, and also local factors such as climate and the physical condition and nature of the infrastructure. Although a detailed knowledge of conditions at the site is unlikely to be available to inspectors before arrival (except for routine inspections) the general requirements may be predictable. Inspectors should therefore be provided, by the TS, with a recommended equipment list for the different situations likely to be encountered and select their requirements from this list as soon as they know where they are going.

14. Medical matters are very important and it will no doubt be necessary for the TS to have medical experts available to offer advice and, if necessary, to accompany inspection teams into the field. Although it is beyond the scope of the present paper to deal with medical aspects of CWC inspections, some general points for individual inspectors to note are as follows:

(a) obtaining any necessary vaccinations;

(b) obtaining any drugs required to treat endemic diseases;

(c) taking a first aid kit containing any personal medicines and syringes and sterile needles as well as the usual things needed to treat minor injuries and ailments, insect bites, etc.;

(d) as safe food and water supplies cannot be assumed in many areas of the world, inspectors will need to take sensible precautions to ensure that they do not become victims of disease.

Chemical hazards

15. It is important that inspectors with appropriate expertise should be available to cover sites with different types of chemical hazard. The guidelines in Appendix 1 have been produced with this fact in mind and have been divided into two parts to cover CW agent as well as general industrial chemical hazards.

16. Different individual protective ensembles (IPE) require different donning and removal procedures. Thought will need to be given to the TS using a standard system of IPE to allow for the proper training of inspectors in its use (but see para. 2.1).

17. Meteorology and downwind vapour hazard prediction form an essential part of safety planning at chemically hazardous sites. Basic wind speed and direction measuring equipment is crucial, together with some form of vapour hazard prediction model. This can be as simple as a set of tables but excellent computer (PC) based programmes are now available that perform all the necessary calculations and present the results in a clear pictorial format.

18. For work in hot weather conditions and tropical climates measurement of the web bulb globe temperature index will be required to enable safe working times in IPE to be calculated. This is crucial if impermeable clothing has to be worn. This measurement can easily be made using inexpensive and portable miniature equipment incorporating electronic computation and direct readout of the required index values.

Structural hazards

19. Some of the more important points to emerge from recent experience are included in Appendix 2 in the form of guidelines for inspectors. Many of these points deal specifically with bomb damaged structures but others are appropriate to general safety on any industrial site, particularly in areas where the maintenance and repair of broken or damaged structures and the removal of hazardous waste may be neglected. For convenience, hazards in bomb damaged structures have been listed separately from more general hazards.

Explosive ordnance hazards

20. It is most unlikely that CWC inspectors involved in Challenge Inspections will encounter unexploded ordnance but it is a possibility, and suitable guidelines are given in Appendix 3. It is much more likely that inspectors will come into contact with live munitions of various natures in storage or

explosives handling facilities. These types of facilities should have their own safety rules but these vary between nations and in any case are open to local interpretation.

21. It is likely that the TS will need to produce a set of agreed guidelines for use in explosives establishments. This will need to cover aspects such as protective clothing and equipment, especially electrical equipment. Since all electrical equipment (including cameras, torches and recorders) need to be certified as safe for use in the various categories of explosives hazard, the TS will need to arrange for certification acceptable to all States Parties.

Radiation hazards

22. Hazards from sources of both ionizing and non-ionizing radiation are unlikely to be encountered by inspectors except during inspections of nuclear sites. However, inspectors should be aware of this possibility and remain alert for sources of radiation.

23. Sources such as 60^{co} are used routinely in medical equipment and in industrial X-ray and gamma ray imaging systems. Inspectors should be familiar with the appearance of this type of equipment and should be aware that it is often used by the military to examine munitions. Consequently, X-ray equipment could be encountered during challenge inspections of ammunition storage and handling facilities.

24. To avoid unexpected exposure to ionizing radiation thought needs to be given to a small portable Geiger counter being a part of standard equipment. Hazards from non-ionizing radiation are likely to be even less of a problem to inspectors but they should be aware of the potential for harm and take care with lasers and microwave sources, including radars.

Packaging and transport of CW-related substances

25. The safe packaging and transport of samples of CW-related substances can cause severe problems. These problems are usually more conceptual than real and safe packaging is quite straightforward. The main problem is perceived to lie with volatile toxic substances that, if not suitably contained, could create a vapour hazard. Non-volatile substances, such as toxins and even pathogens, pose much less of a risk and agreed packaging and transport regulations already exist.

26. The principle on which suitable packaging for volatile toxic substances could be based is to use multiple layers (say three) of containment with a series of robust containers packed in activated charcoal. A vast excess of charcoal would be used so that in the extremely unlikely event of total failure of the primary containers there will be sufficient capacity in the first layer alone to irreversibly absorb all the contents many times over. Furthermore, the outer container would be made of stainless steel with a sealed lid capable of resisting any conceivable impact or pressure change and any fire without distortion, at least until such time as the contents have been destroyed by the heat.

27. Appendix 4 contains details of the requirements for packaging that are currently being discussed in the United Kingdom between the Civil Aviation Authority and the Chemical and Biological Defence Establishment. It seems likely to be accepted as suitable.

Conclusion

28. Given the wide variety of sites that are likely to be encountered by the CWC inspectorate, many of which will be intrinsically hazardous, it will be important that the Technical Secretariat fully considers the safety aspects of inspections. While it would be undesirable to insist on enforcement of rigid rules irrespective of the conditions on site under investigation, a casual attitude to personal and collective safety is equally undesirable. The TS will therefore need to feature safety as a major part of its training programme and to ensure that safety is central to inspections. Safety aspects will depend on the nature of the site under investigation, but inspectors must possess a grounding in basic minimum procedures. It is hoped that the guidelines in this paper and its accompanying annexes will provide a useful starting-point for the Preparatory Commission's own work on inspector safety.

Appendix 1

CHEMICAL SAFETY GUIDANCE FOR CHEMICAL HAZARD AREAS: THESE MEASURES MAY APPLY DURING DESTRUCTION OF PRODUCTION FACILITIES, BULK AGENT AND MUNITIONS

1. General policy

- On matters of safety the advice of the SO should always be followed unless specifically overruled by the CI.

- No potentially chemically hazardous area will be entered by inspectors until a proper reconnaissance has been carried out by the SO.

- No hazardous work will be carried out in the absence of the proper authority (SO or CI) and supervision.

- A minimum of three persons should work together at any time to ensure that any casualty can be evacuated safely.

2. Guidance for inspecting industrial chemical plants

- In the United Kingdom, the Health and Safety Executive's Factory Inspectorate is charged with monitoring and enforcing health and safety legislation at United Kingdom chemical plants. Similar regulatory bodies operate in other OECD countries. Whilst there is no "safety manual" for United Kingdom HSE inspectors as such, which could be used to assist the TS in compiling composite guidelines for its inspectors, individual inspector's approaches to personal safety during factory visits are shaped by the same basic precautions identified in Appendix 2, paragraphs 2 to 8. The Preparatory Commission might none the less invite States Parties to submit any relevant information or any appropriate documentation derived from their own experiences.

3. Guidance for inspecting CW agent contaminated areas

- The respirator, gloves, personal decontamination kit and (if nerve agents are expected) atropine autoinjectors should be carried at all times. Higher levels of protection will be determined by the SO as appropriate.

- Respirators should be checked before entering a possible vapour hazard area.

Appendix 2

STRUCTURAL SAFETY GUIDANCE FOR USE IN UNSOUND BUILDINGS

GENERAL GUIDANCE FOR INSPECTING INDUSTRIAL SITES

1. DO NOT venture into any areas or buildings that have not been cleared by the SO. Never enter a structure alone. IF IN DOUBT, STAY OUT.

Before entering a structure

2. Always wear a hard hat, even if a respirator is being worn.

3. Use adequate lighting. Wait after entering a darkened building from bright sunlight until your eyes become accustomed to the gloom.

4. Keep one hand free and wear gloves, especially in a chemical plant.

5. Walk slowly and keep a lookout in all directions. Remember that vision is restricted when wearing a respirator. Wear safety glasses if available and appropriate.

6. Beware of loose or lightly fixed fittings, cladding sheets, brickwork or structural members such as roof or wall purlins. Do not trust your weight to fixtures, including guard rails, unless sure that they are firmly fixed. Be especially careful in high winds.

7. Beware of areas or buildings that have been damaged by fire; they may fail suddenly. In particular, be wary of concrete that has changed to a pink, white or buff colour which indicates an area of major structural weakness that may not otherwise be apparent; keep clear and inform the safety officer.

8. Watch your footing and wear good solid leather boots. In particular watch out for:

- jagged ends of metal protruding from concrete;
- loose structural elements that may move or fly up when stepped on;
- upward pointing nails in loose boards from packing cases;
- electrical cables, they may be live;
- pipes, especially in a chemical works;
- sloping surfaces;
- slippery and/or wet floors, the "wet" may not be water.

RULES FOR INSPECTING BOMB DAMAGED STRUCTURES

9. Do not congregate in damaged buildings, particularly on floors above ground.

10. Watch out for concrete slab and beam deflections of more than 12° and brickwork that has been displaced sideways by more than half the thickness of the masonry. Structures with these features are extremely unsafe. DO NOT go under them for any reason at all.

11. Buildings that have stood for several months after blast damage may still collapse with little or no warning. A slight gust of wind or the vibration of heavy machinery may be all that is needed to cause collapse. If areas creak or make other noises STAY CLEAR.

Appendix 3

GUIDANCE FOR AREAS WHERE THEY MAY BE UNEXPLODED ORDNANCE

These rules are for general guidance and are not a substitute for rules at ammunition storage or handling facilities. The TS will need to produce a set of such rules agreed by all States party to the CWC.

1. Never enter an area that may contain unexploded ordnance (UXO) without the express permission of the SO.

2. Use of any electrical device (CAM, camera, videocamera etc.) must be approved in advance by the SO or Explosives Ordnance Personnel (EOD). DO NOT carry spare batteries. Battery compartments of electrical devices should be taped to prevent inadvertent removal of batteries in an explosive hazard area. In a chemical plant or storage area the hazard of explosive atmospheres needs to be considered.

3. Watch your step. Walk on hard, cleared surfaces or in areas that you know have been cleared by EOD.

4. Don't touch anything. A UXO may not necessarily look like a munition.

5. Report any suspect UXO, mines, booby traps etc. IMMEDIATELY to the SO or EOD. Keep clear!

6. Report any leakage or vapour emission from a UXO IMMEDIATELY to the SO or EOD (this also applies to munitions in a storage or handling facility). Put on personal respirator and leave the area at once moving upwind but without running. Warn all personnel in the vicinity.

Appendix 4

CONTAINERS FOR TRANSPORTING SAMPLES

1. Primary container:

This will be the container in immediate contact with the sample. The samples will be of three types:

(i) Vapour samples. This container consists of a mild steel tube of approximate dimensions 6 mm (diameter) x 95 mm fitted with airtight end caps. In the tube is rigidly packed 50 mg of an inert absorbent material such as Tenax or Poropak Q. The vapour sample is absorbed on to the absorbent material, and usually requires heating to above 200°C to displace it. The quantity of toxic material in this primary container is of the order of 100 picograms (0.0000001 g);

(ii) Environmental samples. This could be a sample of ditchwater, soil, vegetation, blood, urine or material that is thought to have been contaminated by a toxic substance. These samples will be contained in a 10 ml glass vial that has a "crimp" fitted teflon cap which requires a special tool to remove it. There is no danger of the cap being shaken loose in transit. Typically, up to 10 mg (0.01 g) of toxic compound would be expected in this type of sample;

(iii) Bulk samples. This is the "worst case" sample. A bulk substance sample would be contained in a 2 ml vial sealed with a similar (though smaller) cap to that described above for environmental samples. A sample size of 100 mg (0.1 g) is anticipated for this sample type.

These three sample containments serve as primary containment. They will be labelled as follows:

(a) Sample number

(b) A statement that the contents are "Very toxic".

2. Secondary container:

The secondary container will consist of an aluminium can of dimensions 40 mm (diameter) x 125 mm. The lid will be screw cap fitted with a rubber seal.

Two primary containers will be packed into a secondary container. The primary containers will first be individually packed in a small polythene bag, then in "bubble material" to prevent mechanical damage, and finally, into a secondary container. The void in the secondary container would be filled with the absorbent material AST charcoal. This would render the package safe in the very unlikely event of leakage or seepage from a primary container. Approximately 25 g of charcoal will be used which is sufficient to absorb 2.5 g of material. Hence as the worst possible case only results in 0.2 g of leaking material (resulting from total destruction of two type (iii) primary containers) there is more than a tenfold excess of absorbent material in the secondary container.

After inclusion of the two primary containers and the adsorbent material, the lid will be tightly fitted and sealed with a suitable thread sealant such as "Loctite". The precise contents of the samples will be unknown (the purpose of the exercise) is to analyse them! - but a worst case would be the compound Sarin, which would pose the greatest risk when volatility is taken into consideration as well as toxicity. Based on this premise, the secondary container would be labelled as in figure 1.

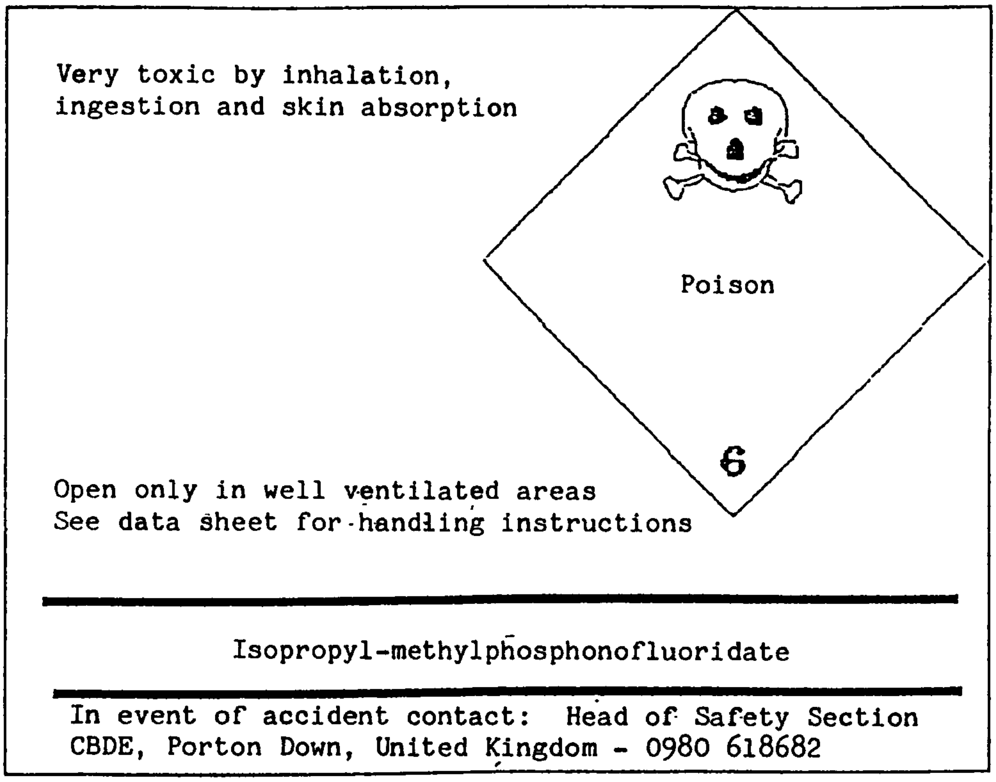

Figure 1

3. Tertiary container:

The proposed tertiary container is one that has been conceived at CBDE and should provide both sufficient protection against mechanical damage, sudden depressurization and fire. The container is a stainless steel bomb of dimensions 160 mm diameter (OD) and 160 mm height. The container will be 10 mm wall thickness and be sealed by a flanged 10 mm lid fitted with a viton "O" ring and secured with six 12 mm diameter bolts. The steel will be to BS 970 325531. A schematic of this container is shown below in figure 2.

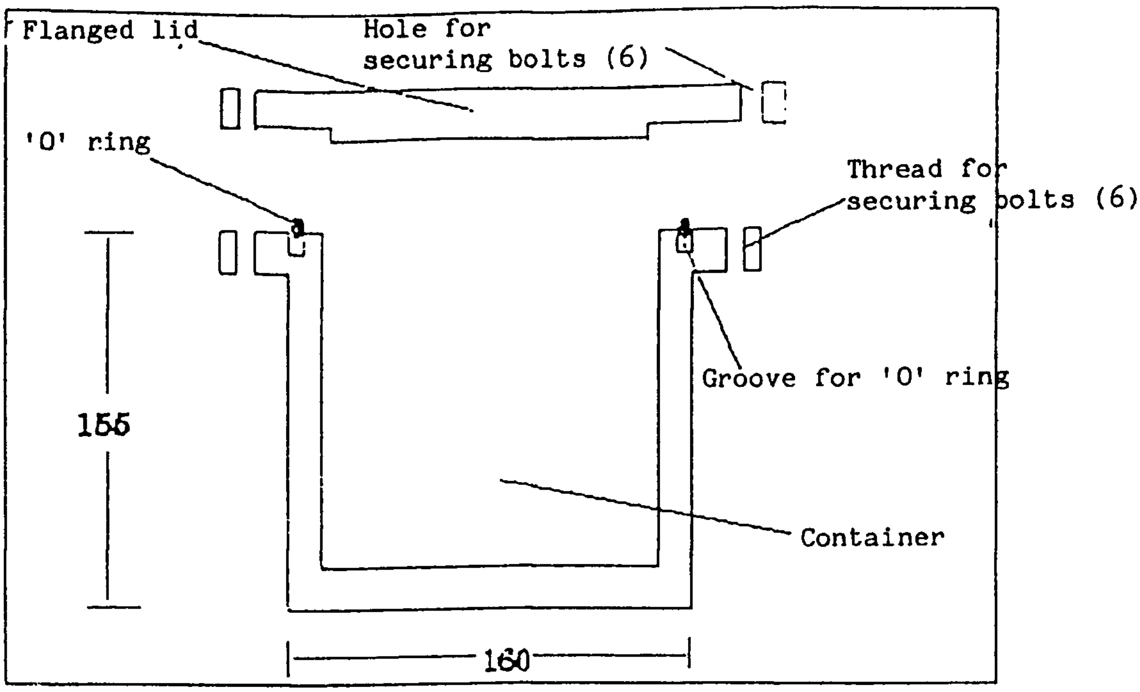

Figure 2: Schematic of tertiary container

The secondary container would then itself be contained in a tertiary container in the following manner. Four secondary containers would be contained in each tertiary container. The void around the secondary containers in this third container would be filled with about 100 g of charcoal. The tertiary container would constitute the container which would provide the samples with a high degree of mechanical and fire protection.

The tertiary container will be labelled as in figure 1 above and will also display two additional labels, viz:

(a) Handling label for package orientation

(b) Handling label Cargo Aircraft Only.

4. <u>Transit case (containment 4)</u>:

The final containment would be primarily for ease of handling and is thus essentially a transit case. The transit case will hold two of the tertiary containers. The transit case will be made of aluminium sheet of approximately 4 mm thickness. The case will be of dimensions 430 mm x 250 mm x 200 mm, will hold two tertiary containers securely in an internal frame and will have a lid that is airtight and be lockable and sealable. Two handles will be attached to the outside to aid in carrying the case.

The case will carry the label shown in figure 3 below. In addition it will also display:

(a) Handling label for Cargo Aircraft Only

(b) Advice to Customs that they may seal the case and be present when it is opened at CBDE if they so wish it.

(c) Safety data sheets will be attached to this container.

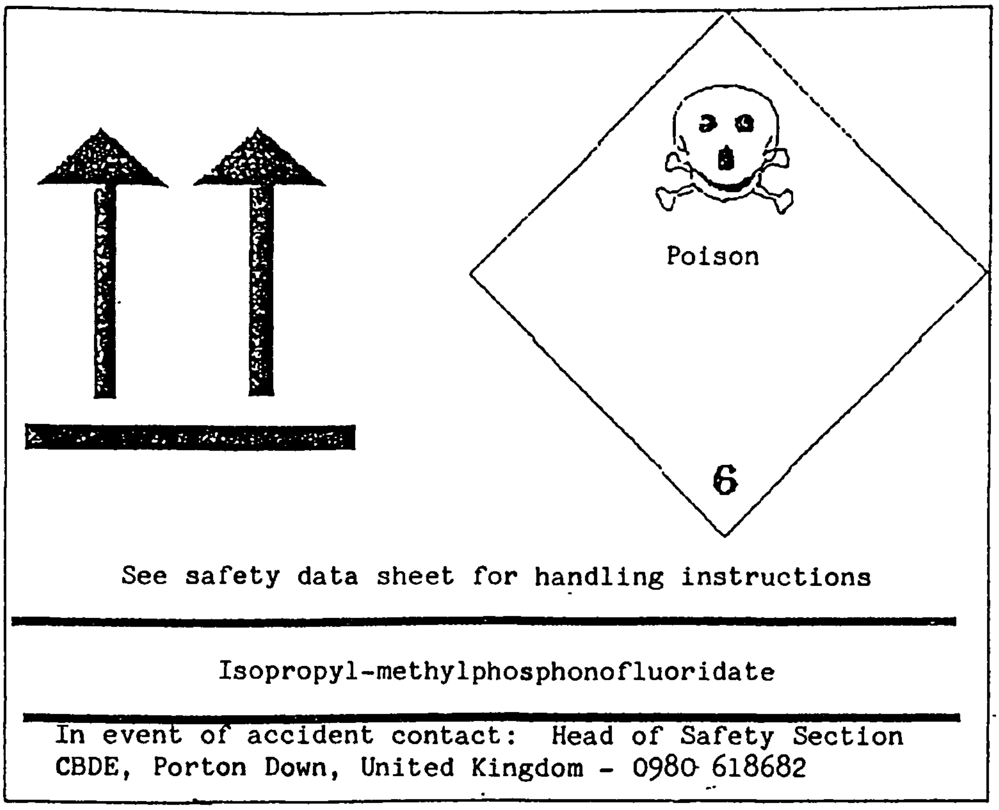

Figure 3: Label for transit case

5. Summary of packaging:

Based on a worst case scenario where bulk agent would be transported, each transit case would contain:

1. Sixteen primary samples of 0.1 g each - total weight 1.6 g.

2. These would be packed in eight secondary containers containing a total of 200 g of charcoal.

3. In turn, the secondary containers would be packed into two tertiary containers together with about 100 g of charcoal in each.

4. Two of these containers would be in each transit case.

5. The net weight of the transit case would be about 35 kg, of which 1.6 g would be sample and 400 g absorbent. Four hundred grams of charcoal is sufficient to safely absorb about 40 g of sample. Thus there is a 25-fold excess of absorbent present even in the worst case.

The contents of the transit case are also summarized below in figure 4.

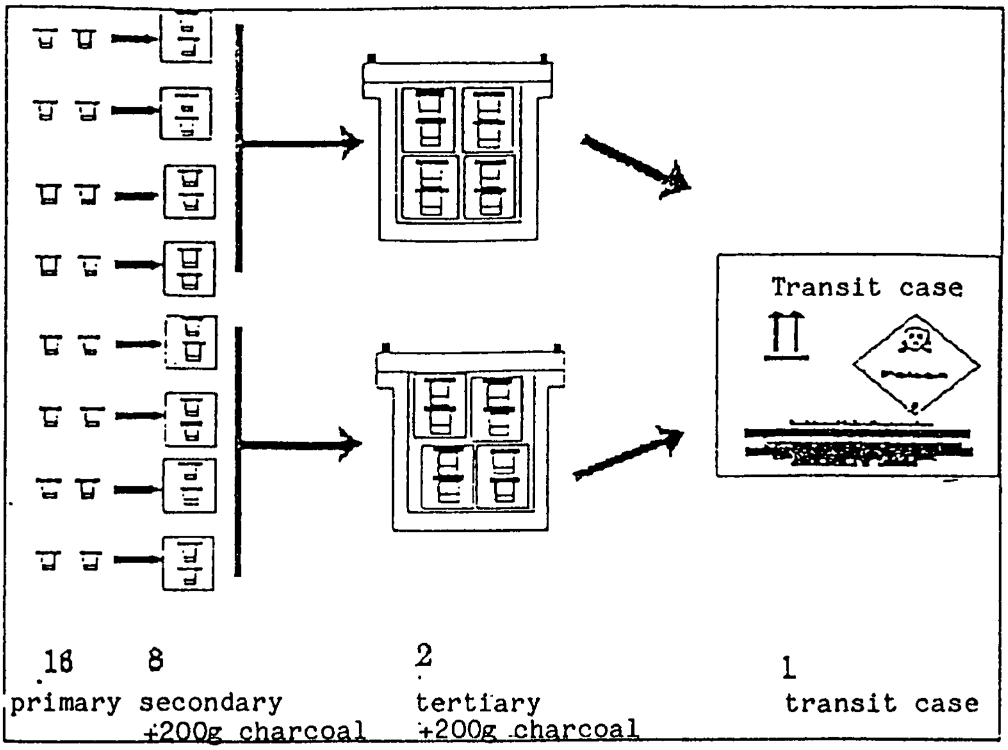

Figure 4: Summary of proposed packaging

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DOCUMENT IDENTIQUE A L'ORIGINAL

DOCUMENT IDENTICAL TO THE ORIGINAL