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DECISION

LIST OF APPROVED INSPECTION EQUIPMENT WITH OPERATIONAL REQUIREMENTS AND TECHNICAL SPECIFICATIONS

The Conference of the States Parties,

Recalling that the Second Special Session of the Conference of the States Parties to Review the Operation of the Chemical Weapons Convention (hereinafter "the Second Review Conference"), in paragraph 9.147 of its report (RC-2/4, dated 18 April 2008), requested the Technical Secretariat (hereinafter "the Secretariat") "to review the operational requirements and technical specifications first approved by the Conference at its First Session (C-I/DEC.71 and Corr.1, both dated 23 May 1997), seeking the advice of the Scientific Advisory Board and to submit a report to the Council";

Recalling also that the Second Review Conference, in that same paragraph of its report, emphasised the importance of such a review, in "that it is essential for effective verification that the Secretariat's approved inspection equipment remains up to date and that the list of such equipment can be adjusted promptly as items become obsolete";

Bearing in mind that the Scientific Advisory Board (SAB) at its Thirteenth and Fourteenth Sessions provided invaluable advice to the Secretariat in regard to the updating of C-I/DEC.71 and Corr.1, and that the Secretariat has taken the advice of the SAB and has incorporated its suggestions;

Taking into account that the Secretariat submitted to the Executive Council (hereinafter "the Council") at its Sixty-First Session a Note (EC-61/S/1, dated 29 March 2010) entitled Proposed Update of List of Approved Inspection Equipment with Operational Requirements and Technical Specifications "… with a view to its making recommendations to the Conference of the States Parties … at its Fifteenth Session";

Also taking into account that some States Parties, in their responses to EC-61/S/1, submitted comments and suggested amendments, which were subsequently incorporated by the Secretariat into a corrigendum (EC-61/S/1/Corr.1, dated 17 September 2010); and

* Reissued pursuant to the approval by the Conference of the list of approved inspection equipment with operational requirements and technical specifications (C-15/S/2, dated 4 November 2010) at its Fifteenth Session.

Noting that, at its Sixty-Second Session, the Council considered the above-mentioned Note by the Secretariat (EC-61/S/1 and Corr.1) and forwarded its recommendations (EC-62/DEC.2, dated 6 October 2010) in regard to the updated list of approved inspection equipment with operational requirements and technical specifications to the Conference of the States Parties (hereinafter "the Conference") for consideration at its Fifteenth Session;

Hereby:

Adopts the list of approved inspection equipment with operational requirements, technical specifications, and common evaluation criteria annexed hereto.

Annexes:

Annex 1: List of Approved Inspection Equipment
Annex 2: General Operational Requirements and Common Criteria for All Inspection Equipment

Annex 1

LIST OF APPROVED INSPECTION EQUIPMENT

The Conference adopted the list of approved equipment in the understanding that:

(a) In accordance with paragraph 29 of Part II of the Verification Annex to the Chemical Weapons Convention (hereinafter "the Verification Annex"), "the inspection of the equipment shall also ascertain to the satisfaction of the inspected State Party that the equipment meets the description of the approved equipment for the particular type of inspection. The inspected State Party may exclude equipment not meeting that description or equipment without the above-mentioned authentication documents and devices".

(b) Paragraph 13 of the Confidentiality Annex to the Chemical Weapons Convention stipulates that "States Parties may take such measures as they deem necessary to protect confidentiality, provided that they fulfill their obligation to demonstrate compliance with the relevant Articles [of the Convention] and the Verification Annex. When receiving an inspection, the State Party may indicate to the inspection team the equipment, documentation or areas that it considers sensitive and not related to the purpose of the inspection." This provision has further been specified in the OPCW Confidentiality Policy. These measures may include restrictions on the use of certain items of inspection equipment, which may be stipulated in facility agreements, when applicable.

(c) In accordance with paragraph 43 of Part II of the Verification Annex, and in accordance with the OPCW Health and Safety Policy and Regulations, the inspected State Party (ISP) may adopt procedures, including restrictions on the use of certain equipment, which may be stipulated in facility agreements, when applicable. In such a case, an alternative inspection procedure should be adopted in consultation with the ISP in order that the goals of the inspection can be accomplished (subparagraph 4.3(a) of the OPCW Health and Safety Policy).

(d) In order to satisfy the ISP and to enable it to familiarise itself with all the operational characteristics concerned, the National Authority of each State Party should have access to each item of equipment contained in the list of approved equipment and how it is to be used in a sufficient amount of time prior to its use on the territory of the ISP. In case any State Party finds that it is denied such access to any item of equipment approved for inspection purposes, it has the right to deny permission for that item of equipment to be used on its national territory. The Director-General is requested to establish an appropriate mechanism to assist the National Authorities in their familiarisation with the approved equipment and its use.

LIST OF APPROVED INSPECTION EQUIPMENT

	Description	Justification for changes from C-I/DEC.71 and Corr.1
	Appendix 1: General inspection equipment	
1	Global Positioning System (GPS)	
2	Weighing equipment	
3	Tape measures (3m, 30m, 100m)	
4	Callipers and steel rulers	
5	Seals (fibre optic and packages) with seal tool	
6	Seals (frangible, fractural, adhesive)	
7	Instant camera (film or digital imaging)	See EC-54/DEC.3, dated 14 October 2008.
8	35mm camera and films	
9	Portable camcorder and player, analog or digital, with removable recording media	Addition of digital media.
10	Binoculars	
11	Data scope	
12	Night-vision scope	
13	Magnifying glass	
14	Compass	
15	Tags/tie-on tags/markers (permanent)	
16	Temperature logger	See C-9/DEC.5, dated 30 November 2004.
	Appendix 2: Administrative equipment	
1	Calculator	
2	Computer (notebook/printer)	
3	Satellite-link telephone terminals	
4	Portable fax machine	
5	Exterior extension cords	
6	Secure voice telephones	
7	Hand-held short-range radios	Hand-held is more specific to what the Secretariat currently has and is consistent with the name of the specification.
8	Maintenance tool kit	
9	Equipment-transport containers	
10	Shoulder bag	
11	Tool belt	
12	Battery packs/recharger	

	Description	Justification for changes from C-I/DEC.71 and Corr.1
13	Power transformer	
14	Power stabiliser	
15	Generators	
16	Hand-held satellite telephone	Never approved before, but it is needed for communication within the inspection site and between the inspection site and OPCW Headquarters, especially in remote areas.
	Appendix 3: Analytical equipment	
1	Gas chromatograph-mass spectrometer (GC-MS)	See EC-49/DEC.3, dated 27 June 2007; and EC-53/DEC.3, dated 24 June 2008.
2	Sample-collection kit for air, solid, liquids, and wipe samples	See EC-36/DEC.2, dated 23 March 2004; EC-47/DEC.9, dated 8 November 2006; EC-49/DEC.3; and EC-53/DEC.3.
3	Alleged-use sample-collection kit	
4	Sample-collection kit for munitions	
5	GC-MS sample-preparation kit	See also references EC-36/DEC.2, EC-47/DEC.9, EC-49/DEC.3, and EC-53/DEC.3.
6	Fourier transform infrared spectrometer (FTIR)	See also S/744/2009, dated 11 March 2009 and S/765/2009, dated 25 May 2009.
7	FTIR sample-preparation kit	
8	Sample-transport kit	
	Appendix 4: Non-destructive evaluation (NDE) equipment	
1	Acoustic-resonance spectroscopy (ARS)	
2	Ultrasonic-pulse echo (UPE)	
3	Neutron-induced prompt-photon spectroscopy (NIPPS)	
4	Hydrogen concentration measurement (HCM)/chlorine-detection system (CDS)	CDS is a component of the HCM device and needs to be added.
5	X-ray equipment	
	Appendix 5: Health-and-safety equipment	
1	Chemical weapons (CW) protective overboots (disposable)	
2	Impermeable CW protective clothing	
3	Air-permeable CW protective suits	
4	CW protective masks	
5	Canisters (CW)	
6	Canisters (industrial)	
7	Safety goggles	

	Description	Justification for changes from C-I/DEC.71 and Corr.1
8	CW protective gloves with liners	See also EC-54/DEC.3.
9	Leather work gloves	
10	Industrial safety helmet with hearing protection	
11	Cotton coveralls	
12	Disposable coveralls	
13	UV protective safety glasses	The UV protective glasses currently used by the Secretariat also meet the same specifications as the safety glasses listed in C-I/DEC.71 and Corr.1, so the two have been listed as one item.
14	Water bottle	
15	Water filter kit	
16	Flashlight (explosion-proof)	
17	Self-contained breathing apparatus (SCBA)	
18	Protective mask (industrial)	
19	Equipment bags with heat sealers	
20	Mask-fit test kit	
21	Cooling vest	
22	Impermeable (gas-tight) protective suits	
23	Impermeable (gas-tight) suits for training	
24	Cold-weather gear	
25	Decontamination kit	
26	Safety lantern	
27	Safety shoes	
28	Flammability/explosive/air-quality/monitor	
29	CW protective boots (reusable)	
30	Team decontamination kit	
31	Detector kit for CW agents	
32	Hand-held CW detectors/monitors (HHDs)	
33	Detector-training kit for CW agents	
34	Detector kit for industrial chemicals	
35	Test-paper packages for CW agents and other toxic chemicals	Test papers for other scheduled chemicals have also been included.
36	Thermochromic tape packages	
37	Wet-bulb globe thermometer	
38	Compressor for SCBA air cylinders	Originally submitted for approval in EC-XV/DG.9 (dated 8 April 1999), but was never approved.

	Description	Justification for changes from C-I/DEC.71 and Corr.1
39	Sun hat	Originally submitted for approval in EC-XV/DG.9, but was never approved.
40	Duct tape	Originally submitted for approval in EC-XV/DG.9, but was never approved. Still needs to be approved for use by inspectors for taping protective suits.
41	Miner's lamp	Originally submitted for approval in EC-XV/DG.9, but was never approved. Still needs to be approved for use by inspectors for hands-free movement in dark and badly-lit areas.
	Appendix 6: Medical equipment	
1	CW casualty-treatment kit	
2	Emergency medical kit	
3	General first-aid kit	
4	First-aid kits (personal)	
5	Patient monitor	
6	Individual heat-stress monitors	
7	Portable acetylcholinesterase-activity monitors	

Relevant documents are attached as follows:

Appendix 1: General Inspection Equipment: Operational Requirements and Specifications
Appendix 2: Administrative Equipment: Operational Requirements and Specifications
Appendix 3: Analytical Equipment: Operational Requirements and Specifications
Appendix 4: Non-destructive Evaluation (NDE) Equipment: Operational Requirements and Specifications
Appendix 5: Health-and-Safety Equipment: Operational Requirements and Specifications
Appendix 6: Medical Equipment: Operational Requirements and Specifications

Annex 2

GENERAL OPERATIONAL REQUIREMENTS AND COMMON CRITERIA FOR ALL INSPECTION EQUIPMENT

1. General operational requirements for inspection equipment:

1.1 When the operational requirements for inspection equipment are being developed, concerns about confidentiality during certain types of inspections should be taken into account; the operational considerations listed below may be applicable to a variety of analytical techniques when the operational requirements for inspection equipment are being determined.

1.2 The Secretariat must have analytical equipment available, the chemical detection and analysis capabilities of which should range from basic to very sophisticated. This range of capabilities, which may be met in single or multiple instruments, would be incorporated into instruments which would have the following minimum characteristics:

(a) a wide dynamic range, sensitivity sufficient to accomplish the purpose of the analysis, and a quick response;

(b) a technique that allows:

(i) the definition of the chemicals relevant to the purpose of the inspection to be detected, identified, and, if necessary, measured;

(ii) identification and recording of the detection of chemicals relevant to the purpose of the inspection, but suppression of the indication and recording of the detection of chemicals and other information unrelated to the purpose of the inspection; and

(iii) convertibility to the presence/absence of scheduled chemicals to the extent derived from the capability/reliability of the equipment (hardware and software);

(c) high reliability;

(d) the capability to rapidly confirm 1.2(a) and 1.2(b) above and 1.2(f) below in the field;

(e) a minimum of false indications;

(f) the capacity to suppress information unrelated to the purpose of the inspection;

(g) the capabilities referred to in 1.2(b)(ii), 1.2(b)(iii), and 1.2(f) must be verifiable in the inspection at the point of entry (POE); and

(h) the capacity to allow, if applicable, for the removal of detachable components capable of retaining chemicals or other information gathered at the inspection site.

1.3 Provided that the requirements for verification are met, and also taking into account the possible application of the equipment for safety purposes, cost-effectiveness will be paramount in decisions in regard to any such equipment.

1.4 The minimum capabilities contained in subparagraphs 1.2(a) to 1.2(h) above are also to be applied, where possible, to inspection equipment other than analytical equipment.

2. Further general requirements for inspection equipment:

2.1 **Anti-tampering features:**

Security against possible tampering should be incorporated when applicable, to include physical security under lock and key, and/or seals (such as detection and monitoring equipment).

2.2 **Decontamination capabilities:**

(a) Items of inspection equipment will be routinely used at chemical facilities throughout the world. Whilst the aim is that such equipment should not routinely become contaminated, it is inevitable that occasional chemical contamination will occur. Equipment that has a high risk of being contaminated should therefore be designed to permit decontamination by suitable means.

(b) To the extent appropriate, equipment parts likely to come into contact with chemicals should be resistant to organic solvents and have a high degree of corrosion resistance. Surfaces should be free from crevices and other entrapment points that might hold residual contamination.

2.3 **Maintenance:**

Maximum supportability between two maintenance cycles is required. Maintenance may need to be carried out in the field for inspection equipment items, and therefore maintenance kits and critical spare parts must be available at the inspection site.

2.4 **Guarantee:**

The period that the equipment is guaranteed should be the longest possible. The guarantee should address on-site and off-site uses and should include maintenance and storage.

2.5 **Performance validation:**

Equipment suppliers must provide a performance-validation report. This will facilitate certification for approval of the equipment by the Secretariat.

2.6 **Compatibility:**

All health-and-safety equipment items that are to be used at the same time must be compatible.

2.7 **Training:**

The supplier is to provide adequate training where applicable. OPCW personnel must be trained in the proper use of all equipment.

2.8 **Workmanship:**

The quality of workmanship must be sufficient to ensure the safety of the users. All components must be durable enough to withstand repeated use and ordinary wear and tear.

2.9 **Power supply:**

All items of electronic and electrical equipment, including those which are battery operated, must be capable of operating with 50 to 60 Hz, 100 to 240 (± 10%) volts, voltage alternating current (VAC) line. Those items of equipment which are hand-operated should be rechargeable.

2.10 **Explosive safety:**

All electronic and electrical equipment that may be used in potentially explosive environments must be intrinsically safe.

3. Common evaluation criteria that apply to inspection equipment:

3.1 Equipment procured by the OPCW will be required to operate efficiently in different geographical regions under a variety of environmental conditions and after transport to inspection sites. Transportation may occur by commercial aircraft, military aircraft (fixed or rotary wing), military or commercial cargo truck, or a combination of these.

3.2 Instrument manufacturers must provide the OPCW with the suitable test results to demonstrate the capability of equipment to survive these operational and transportation environments.

3.3 Inspection equipment will be required to meet operational performance criteria over a temperature range from -25°C to 45°C, and at relative humidity up to 95% (non-condensing). If a specific equipment item does not operate within the range of 5 to 10% relative humidity, this should be made explicit. Specific exception is made

for analytical equipment designed to be used within controlled environments (GC-MS and FTIR instruments), where the temperature limits are from 5 to 30°C and the relative humidity is 5 to 95%.

3.4 Unless otherwise specified, inspection equipment will be required to meet operational performance criteria after undergoing the following simulated transportation test regimes:

(a) a vibration test equivalent to 400km of transport as secured cargo in transport configuration in a military cargo truck;

(b) a low-pressure test, in transport configuration, simulating an ascent rate of 7.6m/s to an altitude of 4,600 metres and a temperature of 5°C (simulates a typical military cargo aircraft-flight profile);

(c) a low-pressure test, in transport configuration, simulating an ascent rate of 4.1m/s to an altitude of 11,700 metres and a temperature of -50°C (simulates a commercial aircraft flight profile);

(d) a drop, in transport configuration, of 0.3m onto a hard, flat surface (simulates a fall from a dolly or fork lift);

(e) in transport configuration, a test simulating exposure to a rainfall of 4cm/hr at a wind velocity of 18m/s;

(f) in transport configuration, a test simulating exposure to 0.177g/m³ of sand blowing at a wind velocity of 18m/s;

(g) in operational configuration, a test simulating exposure to a temperature shock created by rapid movement from 25°C to -25°C (exceptions are made for analytical laboratory equipment, such as the GC-MS and FTIR); and

(h) in operational configuration, a test simulating exposure to an energy deposit for a luminous flux of 1100W/m^2 over a period of six hours.

3.5 The equipment must meet international and State Party requirements for packaging and transport (i.e., it must comply with International Air Transport Association (IATA) regulations).

3.6 All equipment shall be provided with detailed documentation, containing as a minimum the following information:

(a) a description of the equipment, including accessories and attached spare parts;

(b) a description of the main sub-elements of the equipment;

(c) a user manual;

(d) a maintenance and repair manual; and

(e) a warning for hazards associated with the use of the equipment.

3.7 All documentation shall be provided in at least one of the official languages of the OPCW; several official-language versions would be preferable.

Appendix 1

GENERAL INSPECTION EQUIPMENT: OPERATIONAL REQUIREMENTS AND SPECIFICATIONS

1. GLOBAL POSITIONING SYSTEM (GPS)

1.1 General operational requirements:

The equipment is intended to determine the location of the inspection site in accordance with the Chemical Weapons Convention (hereinafter "the Convention"), and must:

(a) have sufficient accuracy to establish a precise location, as required by the Convention;

(b) be able to function without reference to maps or visual markers;

(c) be capable of being checked and of having its memory cleared when inspectors leave the site;

(d) be portable, together with the antenna;

(e) be rugged enough, in transport configuration, to withstand the rigours of transport by aircraft and wheeled vehicles;

(f) meet international and State Party requirements for packaging and transport;

(g) not require operator calibration;

(h) be operable in all geographical areas, and in temperatures ranging from winter to tropical climates, as well as at high altitudes;

(i) be operable by one person;

(j) be operable by an individual in full chemical-protective gear;

(k) be incapable of emitting signals; and

(l) not be capable of interfacing with other equipment.

1.2 Specifications:

The following functional specifications describe the minimum requirements necessary for equipment designed to identify the location of inspected sites.

1.3 **Performance:**

(a) the position location must be able to be displayed in degrees, minutes, and seconds of longitude and latitude, with an accuracy of ± 1 second;

(b) it must be capable of updating readings at least once per minute;

(c) it must be capable of taking an initial reading within 15 minutes of unpackaging; and

(d) it must be capable of taking an accurate reading at any location at least 18 hours out of each day (95% of the time of satellite availability).

1.4 **Transport:**

The GPS must be portable, weighing no more than 4.5kg, including the antenna (if applicable); a weight of 500g is desirable.

1.5 **Operational environment:**

(a) power requirements: a battery with life of at least six operational hours; if rechargeable, battery chargers for both 100/240 VAC line, 50-60Hz; electrical sources must be available;

(b) it must be operable in all weather and at temperatures, from -10°C to 60°C;

(c) the operational reliability should be at least 500 hours mean time between failures; and

(d) training in the use of basic functions of the equipment should not require more than 30 minutes.

2. WEIGHING EQUIPMENT

2.1 **General operational requirements:**

The purpose of the weighing equipment is to weigh large or bulky items.

2.2 **Physical features:**

It must be a self-contained, transportable unit, including compression load cells and tension load cells.

2.3 **Operational features:**

The weighing equipment must incorporate indicator features, push-button tare weight adjustment, auto zero tracking, overload protection, and corrosion-resistant housing.

2.4 **Specifications:**

(a) capacity: 0-10 metric tonnes (MTs), 0 to 5MTs, 0 to 1MTs, and 0 to 0.5MTs;

(b) accuracy: ± 0.1% of applied load at mid-range;

(c) weighing units: MTs, kg;

(d) power: 100 to 240 (± 10%) VAC line, 50 to 60Hz; and

(e) a light-emitting diode (LED) display.

2.5 **Safety:**

The equipment must be easily decontaminated. The equipment must be suitable for use in explosive and chemical environments. The manufacturer must specify which safety codes the equipment meets.

3. TAPE MEASURES

3.1 **Specifications:**

(a) three sets of: 3m, 30m, and 100m lengths; and

(b) should be chemically resistant and made of a flexible material.

3.2 **Safety:**

The tape measures must be able to be easily decontaminated.

4. CALLIPERS AND STEEL RULERS

4.1 **Specifications:**

The callipers and steel rulers should:

(a) be able to measure inside dimensions, outside dimensions, and depth;

(b) have a range of 0 to 30cm;

(c) have an accuracy of ± 1mm; and

(d) should have bevelled edges for threads, depth gauges, long vernier scales, thumb locks, and be manufactured from corrosion-resistant material.

4.2 **Safety:**

The callipers and steel rule must be able to be easily decontaminated.

5. SEALS (FIBRE OPTIC AND PACKAGES) WITH SEAL TOOL

5.1 **Recommendation:**

The seal tool must be compatible with the seals, and therefore should be provided as part of the seal kit.

6. SEALS (FRANGIBLE, FRACTURAL, ADHESIVE)

6.1 **General operational requirements:**

The purpose of seals is to secure structures and containers in particular types of inspections and to prevent undetected access or use. The seal must:

(a) be able to withstand attempts at defeating it;

(b) be counterfeit resistant;

(c) provide a clear indication of having been broken;

(d) not be easily broken by accident;

(e) be able to create a unique, measurably different, and repeatable signature with a permanent record (e.g. photograph) of the seal's integrity; and

(f) be applicable in a short amount of time, if necessary, by an inspector in full protective gear.

6.2 **Seals for sealing samples or other items[1] during the inspection:**

In addition to subparagraphs 6.1(a) to 6.1(f) above, the purpose of these seals is the short-term sealing of samples and other items. They should be easy to apply and be easily verified during the course of the inspection, in large numbers, through the use of equipment transported to the site.

6.3 **Long-term seals:**

In addition to subparagraphs 6.1(a) to 6.1(f) above, such seals must:

(a) be highly resistant to tampering; and

[1] Such items would include, inter alia, doors, sample containers, hatches, and particular munitions items.

(b) be able to sustain long-term exposure to prevailing conditions typical for different inspection sites (e.g. climatic conditions, corrosive factors in the atmosphere, and so on).

6.4 **Specifications:**

Performance:

(a) The seal must be able to withstand attempts at defeating it. Ideally, if broken, there should be no way to reconstruct the seal to its original condition. At a minimum, if the seal is broken, it must take more than 150 hours to reconstruct it, if the break is not to be detected. This criterion must be independently verifiable.

(b) The record of the signature must be comparable with the current signature on site.

(c) The seal loops must be available in lengths varying from 0.2 to 10 metres.

(d) Closing the seal must take no longer than two minutes by a trained operator.

(e) The component specifications for frangible, fracturable adhesive-seals packages should be as follows:

(i) environment: a working life of days and/or weeks; primarily for indoor use; able to withstand temperatures from 0ºC to 40ºC;

(ii) materials: paper, plastic, textile, or a mixture with low "tear" strength; and

(iii) adhesive: should be able to adhere firmly to various surface materials (metal, plastic, textile), with various surface textures and with high adhesive strength; should be resistant to heat and chemical removal.

Transport:

Seal application, reading, and comparison equipment must be portable, weighing no more than 4.5kg, including all expendable supplies for the application of one seal.

7. INSTANT CAMERA (FILM OR DIGITAL IMAGING)[2]

7.1 **Physical features:**

The camera must have a mass of less than 5kg, including the protective carrying case and colour printer, if required.

[2] The following changes were approved by the Council in EC-54/DEC.3.

7.2 **Operational features:**

(a) The camera must be operable at temperatures from 0°C to 40°C, and in an environment where the relative humidity is up to 95% (no condensation can take place).

(b) The camera must be capable of being operated by individuals wearing full chemical-protective gear.

7.3 **Specifications:**

(a) The camera must be equipped with an auto-focussing system, with manual override and an electric flash.

(b) The viewfinder must reflect the image that will result on the exposed film or digital image.

(c) The lens for close-up (at least 30cm) photos must be included with, or attached to, the camera.

(d) The camera must be equipped with a date/time labelling system.

(e) For digital imaging cameras, the minimum resolution must be 5.0 megapixels and the minimum file storage capacity must be 512 megabytes. The files must be stored on a separate and removable data-storage medium. No digital data, image, or any other data must remain in the camera, once the data-storage medium has been removed from the camera. The electronic file format of the digital images must be compatible with common industry standard file formats (e.g., Joint Photographic Experts Group (JPEG), Tagged Image File Format (TIFF)). A colour printer must be included as part of the digital imaging instant camera kit.

8. 35-MM CAMERA AND FILMS

8.1 **Physical features:**

The camera must have a mass of less than 3kg, including the carrying case and any other accessories.

8.2 **Operational features:**

(a) The camera must be operable in all weather conditions and have a waterproof body.

(b) The camera must be capable of being operated by individuals wearing full chemical-protective gear.

(c) An enclosure for the camera must be supplied to protect the camera from chemical contamination.

8.3 **Specifications:**

(a) The camera must be equipped with automatic functioning systems, such as auto-focussing, auto-metering, and auto-zooming, and it must have an automatic flash unit.

(b) The film speed range of the camera must cover at least from ISO 25 to ISO 3200.

(c) The shutter speeds of the camera must cover from 30 seconds to 1/1,000 seconds, plus flash.

(d) The zoom lens must have 28 to 75mm capability, with a lens speed of at least 3.5.

(e) The camera must be equipped with date/time labeling system.

PORTABLE CAMCORDER AND PLAYER, ANALOG OR DIGITAL, WITH REMOVABLE RECORDING MEDIA

9. PORTABLE CAMCORDER

9.1 **Physical features:**

(a) The portable camcorder must have a mass of less than 3kg, including the carrying case and supplies for eight hours of continuous operation.

(b) The portable camcorder must be powered by battery or external power link (AC or DC). The battery must last for more than one-and-a-half hours of continuous operation at 20°C.

9.2 **Operational features:**

(a) The portable camcorder must be operable by one person after two hours of instruction. Easy-to-follow operating instructions must accompany the portable camcorder.

(b) A waterproof cover must be supplied with the portable camcorder.

(c) The portable camcorder must be capable of being operated by individuals in full chemical-protective gear.

9.3 **Specifications:**

(a) The portable camcorder must utilise analog or digital format for high-quality pictures.

(b) The portable camcorder must be equipped with an 8× or higher optical zoom.

(c) The frequency response of the audio system of the portable camcorder must be capable of operating in a range from 30Hz to 15kHz.

10. PORTABLE PLAYER

10.1 **Physical features:**

(a) It must have a mass of less than 3kg, including the carrying case and supplies for eight hours of continuous operation.

(b) It must be powered by battery or external power link (AC or DC). The battery must last for more than one-and-a-half hours of continuous operation at 20°C.

10.2 **Operational features:**

(a) Easy-to-follow operating instructions must accompany the portable player.

(b) The portable player must be operable at temperatures from 0°C to 40°C, and in a relative humidity of up to 95% (non-condensing).

10.3 **Specifications:**

(a) The portable player must be capable of playing both standard digital or analog formats.

(b) The frequency response of the audio system of the portable player must be in the range of 30Hz to 15kHz. The portable player must have a stop and a slow-motion function.

11. RECORDING MEDIA

11.1 **Specifications:**

The digital or analog recording media shall conform to internationally recognised standards.

12. BINOCULARS

12.1 **Specifications:**

(a) The magnification of the binoculars must be more than 7×. The diameter of the objective lens of the binoculars must be at least 50mm, giving a field of view of 120 metres at 1000 metres.

(b) The binoculars must weigh less than 2kg, including the carrying case, a battery (or batteries), if applicable, and any other accessories.

(c) The binoculars must be operable in all weather conditions, and must have a waterproof and fog-proof body.

13. DATA SCOPE

13.1 **Specifications:**

(a) The scope must be one-hand operable and capable of providing the bearings, range, and time data in the field of view.

(b) The scope must be equipped with an auto-focussing system and be auto-adjusting.

(c) The scope must have a mass of less than 500g, including batteries and any other accessories.

(d) The scope must be powered by a battery (or batteries). The battery or batteries must last for more than eight hours of continuous operation at 20°C.

(e) The scope may be used as a compass, range finder, or as a chronometer with the 5×30 mm monocular lens.

(f) The scope must be operable in all weather conditions.

14. NIGHT-VISION SCOPE

14.1 **Specifications:**

(a) The scope magnification must be at least 1.5×.

(b) The weight of the scope must be less than 2kg, including the carrying case, batteries, and any other accessories.

(c) The scope must be powered by a battery (or batteries) and be operable in a passive mode only, by using the existing starlight and/or surrounding light without a need for any additional artificial illumination. The battery (or batteries) must last more than eight hours of continuous operation at 20°C.

(d) The scope must be operable in all weather conditions.

(e) The scope must operate under low ambient light conditions, i.e. at night with passive starlight.

15. MAGNIFYING GLASS

15.1 **Specifications:**

(a) The magnification of the lens must be more than 5×, with a lens diameter of 5 to 7cm.

(b) The lens must be provided with an appropriate cover or, if plastic, the lens must be hard-coated to prevent scratches.

16. COMPASS

16.1 **Specifications:**

The compass must be a standard hand-held lensatic compass.

17. TAGS/ TIE-ON TAGS/ MARKERS (PERMANENT)

17.1 **Specifications:**

(a) Tags:

(i) The tags must be self-adhesive and must readily adhere to clean surfaces.

(ii) The tags must be able to provide any indication of tampering.

(iii) The tags must provide unique forms of identification, e.g. numbers, bar codes, and so on.

(iv) The tags must be able to withstand temperatures ranging from -30°C to 120°C and, once in place, must not be affected by moisture.

(v) The tags must be capable of being removed from their protective backing by operators wearing gloves.

(b) Tie-on tags:

(i) The tags should be fabricated from polytetrafluoroethylene (PTFE) coated, aluminium, or material with equivalent performance and resistance to corrosion.

(ii) They must provide indication of tampering.

(iii) They must provide unique forms of identification, e.g. numbers, bar codes, and so on.

(c) Markers (permanent):

(i) The markers must write on smooth surfaces.

(ii) They must be waterproof, with non-fading ink that dries instantly.

(iii) They must be available in various colours.

(iv) Point size: they must be available in various point sizes, with a minimum size of at least 1mm.

17.2 **Safety:**

The tags and markers must be capable of being disposed of safely, with minimum impact on the environment.

18. TEMPERATURE LOGGER[3]

18.1 **Purpose:**

The temperature logger is needed to measure and record the temperature around two kinds of approved inspection items, medical kits, and sample-transport containers. It provides a reliable means of determining whether medical kits have been exposed to large variations in temperature, information that is needed for safety reasons. A temperature logger also indicates whether sample-transport containers have been exposed to extremely high or low temperatures, information that is required to ensure the validity of laboratory results. The device needs to record temperatures in the temperature-measurement range specified below for at least one month at the sampling rate specified below.

[3] This equipment was approved by the Conference at its Ninth Session (decision C-9/DEC.5, dated 30 November 2004).

18.2 **Specifications:**

(a) The temperature logger must have a temperature-measurement range of -30°C to +50°C.

(b) It must have a data capacity of at least 30 days' sampling, based on a rate of one reading every five minutes.

(c) It must have a sensor accuracy of ± 0.5°C.

(d) It must have a serviceable life of six years or longer.

(e) It must be battery operated.

Appendix 2

ADMINISTRATIVE EQUIPMENT: OPERATIONAL REQUIREMENTS AND SPECIFICATIONS

1. CALCULATOR

1.1 **Specifications:**

The calculator must be capable of most scientific and mathematical functions, but it must not be programmable.

2. COMPUTERS (NOTEBOOK/PRINTER)

2.1 **Physical features of the computer:**

(a) The weight must be less than 3kg.

(b) The size should be approximately 36cm wide, 26cm deep, and 3cm high.

(c) The computer must be equipped with a long-life, rechargeable lithium-ion battery, enabling a minimum of six hours' running time.

(d) The non-volatile computer data storage device must be removable.

(e) The software and hardware should be in a form that can be easily checked and compared with the verified original software and hardware packages.

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2.2 **Specifications:**

The following technical specifications are the minimum required:

(a) a computer-processing unit (CPU) and random-access memory (RAM) that provide support for efficient multitasking in a Windows environment, with Microsoft Office and other applications in a mission software package;

(b) a removable non-volatile data-storage device with a capacity to store at least 80 gigabytes (GB) of encrypted data and with a sustained "disk-to-buffer" data-transfer rate of at least 70 megabytes per second;

(c) screen: a 15 to 17-inch liquid crystal display (LCD) panel screen, with a resolution of 1280x800 WXGA or better, and LED backlighting;

(d) the computer must operate over a wide range of voltages (100 to 240 VAC line, 50 to 60 Hz), and have an external European plug;

(e) interfaces and ports: three USB 2.0 ports, a VGA, and a display serial port;

(f) it should be capable of running Windows operating systems; and

(g) must incorporate a driverless encrypted USB memory stick capable of storing at least one gigabyte (GB) of data.

2.3 **Physical features of the printer:**

The printer must be compact and easily transportable.

2.4 **Specifications:**

(a) The printer must operate over a wide range of voltages (100 to 240 VAC line, 50 to 60 Hz).

(b) It must weigh must less than 20kg.

(c) Laser printers must print faster than four pages per minute.

(d) Ink-jet printers must print at least three pages per minute.

(e) Printer/toner cartridges should not leak when equipment is rotated 360 degrees in any direction.

3. SATELLITE-LINK TELEPHONE TERMINALS

3.1 **Specific operational requirements:**

The purpose of the equipment is to allow communication between the inspection team and OPCW Headquarters (paragraph 44 of Part II of the Verification Annex). The equipment must allow for direct communication, irrespective of the location of the inspection site. It must have a short set-up time. The equipment must be functional under a variety of climatic conditions (rain, snow, and extremes of temperature and humidity). It must be able to be used in conjunction with secure communications equipment and facsimile transmission. The equipment must have frequency convertibility that complies with local regulations. It must emit no unauthorised signals without the consent of the ISP, which must be able to verify that the equipment is not emitting unauthorised signals. The equipment must only use satellites used by international organisations (examples may include Inmarsat). It must comply with local regulations in relation to radio communications.

3.2 **Function:**

Dial-up, secure or non-secure, telephone service using a commercial satellite transponder.

3.3 **Specifications:**

Modes of operation:

(a) Commercially secure:

Voice: 2,400 bps;

Fax: 2,400 bps (requires external-user secure fax machine); and

Data: 2,400 bps (requires external-user computer).

(b) Non-secure/clear:

Voice: 2,400 bps;

Fax: 2,400 bps; and

Data: 2,400 bps.

(c) Must have the capability to restrict the telephone numbers that can be accessed.

Frequency:

(a) Radio frequency subsystem; and

(b) ≅ 5W international Ku-band or L-band.

Antenna:

Omnidirectional or directional (preferably the size to be no greater than 40cm by 60cm).

Secure voice telephone set:

Any commercial/export model.

Primary power:

100 to 240 VAC line, 47 to 63Hz; 12 to 24 voltage direct current (VDC) vehicular.

Alternate power:

If available: three to four hours operation with rechargeable battery pack.

Size:

Terminal flight case with approximate dimensions 26cm (H) x 64cm (W) x 40cm (D).

Weight:

No greater than 30kg, including an over-pack and maintenance kit.

Operating temperature:

-25°C to +55°C.

4. PORTABLE FAX MACHINE

4.1 Physical features:

The fax machine must weigh less than 6kg.

4.2 Specifications:

The following technical specifications are the minimum required:

(a) the fax machine should transmit and receive faxes at 14.4Kbps (kilobit per second);

(b) V.42 and V.42bis communication protocols (error correction and compression);

(c) it should be equipped with a 14.4Kbps acoustic coupler;

(d) it should be capable of operating over the normal two-wire Public Switched Telephone Network (PSTN); and

(e) it should be powered by battery or external power link (100 to 240 (± 10%) V, 50 to 60Hz).

5. EXTERIOR EXTENSION CORDS

No specifications are required for the extension cords.

6. SECURE VOICE TELEPHONES

6.1 Specific operational requirements:

The purpose of the equipment is to enable secure communication between the inspection team and OPCW Headquarters.[4] The equipment must be field transportable, operable on portable power supplies, and inter-operable with both the team's satellite communication equipment and commercial telephone systems. If a telephone system is linked through a satellite link, the operational requirements of satellite-link radios apply. It must comply with local regulations in relation to radio communication.

6.2 Function:

The telephones should be capable of world-wide voice/data transmission using local wire-line telephone system access in either non-secure or commercial secure modes.

6.3 Specifications:

6.4 Performance:

The secure wire-line telephones should be capable of the following:

(a) enhanced 9.6 and 4.8Kbps secure-voice quality;

(b) secure data at rates of up to 9.6Kbps;

(c) high-level encryption via an advanced proprietary encryption algorithm;

(d) multi-mode encryption key management system;

(e) of operating over the normal two-wire Public Switched Telephone Network (PSTN);

(f) equipped with 14.4 Kbps acoustic coupler;

(g) automatic re-dial, hands-free speaker phone, memory dial capability;

(h) information data display; and

(i) tone or pulse-dialling options.

6.5 Environment:

Must operate within the temperature range of 0°C to +50°C.

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[4] Administrative and possible technical matters in relation to the use of secure telephones require further consideration in the light of paragraph 49 of Part II of the Verification Annex.

6.6 **Power requirements:**

(a) input voltage: 100 to 240 VAC line;

(b) input frequency: 47 to 63 Hz; and

(c) input power: up to 20 watts.

6.7 **Physical specifications (desktop model):**

Approximate dimensions and weight: 12cm (H) x 26cm (W) x 4cm (D) and 4kg (without the case).

6.8 **Accessories:**

(a) a carrying case; and

(b) a push-to-talk handset.

7. HAND-HELD SHORT-RANGE RADIOS

7.1 **Specific operational requirements:**

(a) Short-range communication equipment provides communication between personnel patrolling the perimeter and other members of the inspection team. It must comply with local regulations in relation to radio communication (paragraph 44 of Part II of the Verification Annex).

(b) It must be easy to operate, including by individuals in full chemical-protective gear; be battery-operated and allow continuous operation for a reasonable period of time; transmit a clear voice over a range from one side of the perimeter to the other; and be hand held.

7.2 **Function:**

These hand-held radios should be portable, short-range, and provide non-secure radio communication.

7.3 **Specifications:**

The hand-held radios should:

(a) have an operating range of up to 5km;

(b) have transmission power of up to 5 watts (VHF) or 4 watts (UHF);

(c) include an audio jack for headset operation;

(d) be battery operated (rechargeable type such as NiCd);

(e) have digital frequency selection, capable of interface with frequency selection/limiting equipment;

(f) be capable of voice-/button-activated transmission;

(g) have a high impact-resistant-case, with protective gasket and weather-resistant grille; and

(h) be intrinsically safe (suitable for use in hazardous areas).

7.4 **Accessories:**

This radio should have:

(a) a carrying case and belt clip;

(b) a plug-in wall charger for batteries (input voltage 100 to 240 VAC line);

(c) a head set;

(d) a fitted plastic outer bag (to protect from exposure to potentially damaging elements);

(e) a programming kit that includes a laptop computer and programming software for reprogramming the frequencies on the short-range radio is necessary. Reprogramming can only be performed by trained, authorised staff; and

(f) a repeater system is necessary when short-range radios are used during inspections of large areas where communication by means of short-range radios is not possible.

8. MAINTENANCE TOOL KIT

8.1 **Specifications:**

(a) The tool kit must comprise a variety of essential tools for the maintenance and repair of the inspection equipment.

(b) It must be possible to be carried with one hand, and it must weigh no more than 15kg.

(c) A toolbox must be supplied for the transportation of all tools.

9. EQUIPMENT-TRANSPORT CONTAINERS

9.1 **Specifications:**

(a) The containers should be of a durable construction, able to withstand transport environments described in paragraph 3 of Annex 2.

(b) The sum of any two dimensions shall not exceed three metres.

(c) The containers should have recessed carrying handles.

(d) Each container should weigh no more than 10kg.

(e) Containers should be capable of holding material up to 60kg.

(f) Each container should be capable of being secured by a padlock.

10. SHOULDER BAG

10.1 **Specifications:**

The shoulder bag should:

(a) be a carrying bag with padded shoulder straps;

(b) have a capacity of 50 to 100 litres; and

(c) be strong enough to hold up to 20kg of cargo.

11. TOOL BELT

11.1 **Specifications:**

(a) The tool belt must have a variety of pockets able to carry a wide variety of tools.

(b) The pockets must be attached to a belt that can be adjustable.

12. BATTERY PACKS/RECHARGER

12.1 **Specifications:**

(a) The battery packs must include commonly used cell types such as AA, AAA, C, D, or 9V.

(b) The battery packs must be rechargeable more than 1,000 times.

(c) The recharger must be operable with 50 to 60 Hz, 100/240 (± 10%) VAC line, with step voltage capability.

(d) The recharger must be operable at temperatures from 0°C to 40°C, in relative humidity of up to 95% (non-condensing).

(e) The recharger must be capable of full recharging of the battery pack in less than five hours.

13. POWER TRANSFORMER

13.1 **Specifications:**

(a) The transformer must be capable of converting electric line voltage as required with a specific item of inspection equipment within less than ± 10% tolerance of the voltage.

(b) The transformer must be operable with 50 to 60Hz, 100/240 (± 10%) VAC line, 20 amperes, with step voltage capability.

14. POWER STABILISER

14.1 **Specifications:**

(a) The stabiliser must be operable with 50-60 Hz, 100/240 (± 10%) VAC line, 20 amperes with step voltage capability.

(b) The stabiliser must be capable of regulating the voltage surge of electric line at least in the range of ± 5% of the set-up voltage.

15. GENERATORS

15.1 **Specifications:**

(a) The generator must be capable of providing at least 3kW power of energy with appropriate voltage for each type of inspection equipment.

(b) The generator must be transportable, weighing no more than 70kg.

(c) The generator must be capable of operating at temperatures from 0°C to 40°C, in conditions where the relative humidity is up to 95% (non-condensing), and at altitudes from sea level to 3,050 metres.

(d) The generator must be operable in all weather conditions.

(e) The generator must be run on commercially available fuels, such as diesel oil.

(f) The generator must operate for at least 12 hours without needing refuelling.

16. HAND-HELD SATELLITE TELEPHONE

16.1 Specific operational requirements:

The purpose of the equipment is to allow communication between members of inspection team on inspections, and between OPCW Headquarters and the inspection team. The equipment must allow for direct communication, irrespective of the location of the inspection site. It must have a short set-up time. The equipment must be functional under a variety of climatic conditions, i.e. rain, snow, and extremes of temperature and humidity. It is not required that the equipment be able to be used in conjunction with secure communications devices. The equipment must have frequency convertibility to comply with local regulations. It must emit no unauthorised signals without the consent of the ISP. The State Party must be able to verify that the equipment does not emit unauthorised signals. The equipment must only use satellites used by international organisations (examples may include Inmarsat). It must comply with local regulations in relation to radio communications.

16.2 Function:

Dial-up, non-secure, telephone service using a commercial satellite transponder.

16.3 Specifications:

(a) Primary power: 100 to 240 VAC line, 47 to 63Hz; 12 to 24 VDC vehicular;

(b) Alternate power: If a rechargeable battery pack is available, the telephone should be capable of operating up to three or four hours on the battery pack.

(c) Weight: it should weigh no more than 7kg, including accessories; and

(d) Size: in a carrying case, its dimensions should be no greater than 50 x 40 x 20cm.

16.4 Environment:

The telephone must be operable within a temperature range of -25°C to +50°C.

16.5 Accessories:

The hand-held satellite telephone should have a carrying case.

Appendix 3

ANALYTICAL EQUIPMENT: OPERATIONAL REQUIREMENTS AND SPECIFICATIONS

1. GAS CHROMATOGRAPH-MASS SPECTROMETER (GC-MS)

1.1 General operational requirements:

Subject to the general operational requirements for inspection equipment, the portable GC-MS to be used for on-site inspections must provide the capability for the detection and identification of chemical compounds. The portable GC-MS must:

(a) be capable of analysing compounds relevant to the Convention;

(b) be equipped with a variety of sample-introduction techniques;

(c) contain data-comparison libraries that are limited to chemicals relevant to the Convention;

(d) be configured in such a way that data acquisition, storage, and library-comparison hardware and software are independent of, and separable from, the instrument-controller hardware and software. All data in non-volatile memory must be retainable at the inspected site under the joint custody of the Secretariat and the ISP;

(e) be sufficiently sensitive to identify materials in the aliquot introduced into the instrument;

(f) be operable in a variety of modes in order for intrusion to be minimised;

(g) have sufficient chromatographic resolution to distinguish target materials from background and interfering chemicals;

(h) be temperature programmable;

(i) have sufficient resolution and mass range to detect volatile samples relevant to the Convention;

(j) meet the safety requirements of the environment in which it is to operate;

(k) be ruggedised and modularised for transportation with modules that can be carried by two persons;

(l) have a short repeat-analysis time;

(m) be operable by one person;

(n) be operable independently of inspection-site support for the duration of the inspection;

(o) be operable over the range of temperatures expected during all inspections; and

(p) be capable of decontamination, if necessary.

1.2 **Specifications:**

Physical features:

(a) Weight: the maximum weight per module should be no more than 70kg, including overpacking (less than 35kg is desirable).

(b) Size: the maximum length in any dimension should be no more than 1.2 metres, including the overpacking.

(c) Power requirement: operable with 50 to 60 Hz, 100/240 (± 10%) VAC line with step voltage capability or be capable of operating with available transformers:

(i) should draw a maximum power of 4 kW; and

(ii) must be operable from portable power supplies.[5]

(d) Overpack: the GC-MS must be provided with transport appliances.

Operational features:

(a) The system must be capable of being set up and ready for operation (be unpacked, assembled, and calibrated) in a time not to exceed three hours, and preferably within 60 minutes.

(b) The system must be operable by one person.

(c) The system must be capable of being set up by no more than two people.

(d) The system must be capable of continuous operation for a period of 24 hours:

(i) the warm-up time should not exceed one hour; and

(ii) the system should be able to be dismantled and repackaged for transport in no longer than two hours.

(e) The system must be capable of operation in temperature extremes from 10°C to 35°C. [6]

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[5] If the power supply is not sufficient, then a portable power supply will be used.

[6] The current Agilent GC-MS model uses these working temperature ranges.

1.3 **Specifications for the MS:**

(a) Ion source: 50 to 100 electron Volts (eV), EI with 70eV EI is recommended. The incorporation of other ion sources, such as CI, is desirable;

(b) Mass range: the hardware must be capable of a mass range from 10 to 500Da; greater mass ranges are desirable;

(i) the mass range utilised in any given inspection will be controlled by software;

(c) Accuracy resolution: unit mass resolution over the entire mass range; a mass accuracy of 0.3Da over the entire mass range; and a maximum drift of 0.1Da under continuous power over eight hours;

(d) Scan rate: variable and up to 2000Da/s minimum;

(e) Linear dynamic range: relative signal intensity linear over four decades as a minimum;

(f) Sensitivity: a GC-MS sensitivity for 1ng of methyl stearate, measured at m/z 298 in the reconstructed ion chromatogram, must have a S/N ratio ≥ 10:1 when scanning at a full range (10-500Da) at a scanning speed of at least 500Da/sec; and

(i) sensitivity as specified: sensitivity utilised in any given inspection will be controlled by software;

(g) The instruments will be measured against the following evaluation criteria:

(i) FSM: by injecting into the GC 50ng (desired: 1ng) of Malathion, a S/N ≥ 10:1 should be obtained at m/z 173 during full scanning over the entire mass range (10-500Da) at a scanning speed of at least 500Da/sec.; and

(ii) SIM: by injecting into the GC 5ng (desired: 100pg) of Malathion, a S/N ≥ 10:1 should be obtained;

(h) The system must feature an automatic auto-tune/auto-calibrate routine with an internal standard;

(i) The system must have self-protection features to prevent damage due to malfunction of the various modules, for example by the source pressure indicator, the source current, the electron multiplier current, by a power failure, and filament damage. These safety measures must be triggered automatically;

(j) the system must have an ion source that is replaceable in the field to resume operation in less than 30 minutes;

(k) the system must be capable of maintaining a pressure of 3.5×10^{-4} kPa (5×10^{-5} Torr) in the ion source at specified GC flow rates;

(l) additional inlet systems for the MS for more direct sample introduction, to replace the GC inlet, are a required feature for volatilised samples; and

(m) the sample inlet must allow heating up to 250°C.

1.4 **Specifications for the GC:**

(a) The system must be capable of programmable operation (linear ramps with a maximum rate of no less than 15°C per minute) from ambient +20°C to 300°C with an accuracy of 0.5 K per minute.

(b) The system must be capable of isothermal operation.

(c) The system must be regulated, reproducible, and should have an adjustable carrier gas flow rate of 0.2 to 2.5 ml/min. with an accuracy of ± 1%.

(d) The system should be capable of multiple sample-introduction modes:

(i) liquid samples will be introduced via an injection port equipped with a split/split-less mode using volumes in the range 0.1 to 2µl; and

(ii) for analysis of volatile chemicals, a concentrator/desorber system will be needed.

(e) The system must be capable of cooling rate from 300°C to ambient temperature (+20°C) and attain a stable temperature in no more than 15 minutes.

(f) The system must be capable of accepting capillary columns differing in length and up to 25 metres as a minimum, with a capability to 50 metres being desirable.

1.5 **Data and software systems:**

(a) The software system must allow for specific adjustment of the GC-MS capability as required for use in individual inspections and as regulated by the Secretariat. Such adjustment of capability will involve, inter alia:

(i) provision for the convertibility of MS output to display only the presence/absence of chemicals relevant to the aims of specified inspections, e.g. scheduled chemicals at industrial facilities, with a minimum of false indications;

(ii) sensitivity;

(iii) mass range; and

(iv) reference data base.

(b) Each inspection-specific software programme will be part of the system that will receive independent certification from the Secretariat. If complementary measures have been used for the adjustment of capability, they must also be certified by the Secretariat in relation to security and are subject to inspection/verification by States Parties.

1.6 **Specific features of the software system:**

The data system of the instrument must be capable of being used with OPCW dual-mode software for blinding and the Automated Mass Spectral Deconvolution and Identification System (AMDIS), and of incorporating mass spectra from the OPCW Central Analytical Database (OCAD).

1.7 **Instrument operator-training system:**

Training software for instrument operations is desirable for data acquisition and data manipulation. It is desirable that the software operate independently of the analytical instrument.[7]

1.8 **Computer system:**

(a) Instrument control: Instrument control should be performed by a dedicated processor.

(b) Data acquisition: Data acquisition and data transfer should be performed by a dedicated processor. No hidden data storage hardware or software shall be permitted.

[7] There are no differences between the training software and the on-site software.

(c) Data analysis: This function will be performed by a portable computer with a detachable hard disk.

(d) The software and hardware used for instrument control, data acquisition, data transfer, and data analysis should be in a form that can be easily checked and compared with the verified original software package.

1.9 **Data analysis:**

(a) Data analysis must be capable of being carried out using OPCW dual-mode software for blinding, AMDIS deconvolution software, and the data found in the OCAD. [8]

(b) Anti-tampering: It is advisable to establish provisions to prevent and detect unauthorised changes in system configuration (for example, replacement of computer components), and unauthorised changes to operational software.

(c) The capability must exist to limit the data contained in the mass spectra library to compounds relevant to the aims of an inspection.

1.10 **GC-MS spare parts, tool kit, gas-connection kit, and auto-injector/sampler:**

(a) The GC-MS must be accompanied by a spare parts kit, consisting of assorted spare parts and tools, which would allow for minor repairs to be carried out, so that the instrument could be kept running. The kit shall include, but not be limited to, the tools needed for repairs and spare parts for the GC (such as liners, septa, ferrules, and so on) and spare parts for the MS (such as, filaments, fuses, and so on).

(b) The GC-MS system must have gas-connection kit that provides a flow of gas from a source (such as a cylinder, a generator, and so on) to the instrument. This kit shall include, but not be limited to, gas regulators, tubing, and connectors.

(c) To reduce injection error, automate the GC-MS analysis, and increase the throughput of analysis, the GC-MS may also include an auto-injector/sampler. All components needed for the operation of the auto-injector shall include, but not be limited to, syringes, vials, and inserts.

Any changes to the composition of the kits are subject to inspection and/or verification by States Parties.

[8] The details have been addressed by the Analytical Task Force in the AMDIS deconvolution software and the OCAD.

2. SAMPLE-COLLECTION KIT FOR AIR, SOLID, LIQUIDS, AND WIPE SAMPLES

Sampling equipment is required for the extraction of samples during the course of an inspection for analysis on-site, or off-site in a manner that takes into account the local and/or the ISP's safety and environmental regulations. Different sampling kits may be required for the taking of different types of samples. The equipment must be able to be operated by individuals wearing full chemical-protective gear. It must enable the provision of a continuous chain of custody. It must also provide for safe sample storage in a manner that ensures the integrity of the sample.

2.1. General requirements of the sample-collection kit for air, solid, liquids, and wipe samples:

In addition to the requirements in paragraph 2 above, the sampling kit must:

(a) be capable of acquiring air, solid, and liquid, as well as wipe samples. Examples of other materials from which samples should be taken are gaskets, filters, valve packing, paint, concrete, and plastics;

(b) be adequate to collect sufficient independent solid, liquid, or vapour samples to satisfy the inspection requirements;

(c) be used in accordance with procedures which permit samples that are collected for verification purposes to be sufficiently large for splitting into aliquots if off-site analysis is required. Sufficient samples must be available after splitting to allow for analysis and to maintain an effective chain of custody;

(d) be pre-cleaned, subpackaged, and security-sealed to preclude contamination, and must be subjected to an approved quality-control regime. Sufficient spare components should be included to enable checks for the absence of contamination to be undertaken by the ISP, if it requests this;

(e) have procedures which prevent the possibility of cross contamination of samples. For example, all items that come into contact with collected samples could be disposable. Such items would be used only once;

(f) contain packaging material, forms, and tamper-indicating seals and labels for establishing a chain of custody;

(g) be designed for use by personnel in full protective gear, if used in a chemical weapons environment;

(h) be designed to present no additional hazard to inspectors and to minimise any risk to the environment; and

(i) be in accordance with decisions made by expert groups as to whether it is necessary for some items and/or materials to be left at the inspection site for reasons of safety and/or confidentiality.

2.2 List of equipment items and specifications for the standard sampling kit

The table below shows the contents of the sample-collection kit, which consists of a sufficient number of items enabling approximately six air, solid, liquid, and wipe samples to be taken. If a larger number of samples are expected to be taken, the contents of the kit must be modified accordingly. These items will be packaged in suitable shipping containers.

Item	Solid Samples	Liquid Samples	Wipe Samples	Commonly Used Items	Air Samples	Approximate Number of Items	Changes from C-I/DEC.71 and Corr.1
Glass vials/bottles with screw caps with inert elastomer seals, sizes ranging from 1ml to 500ml	X	X	X			Various numbers	
Glass engraver				X			Approved in EC-49/DEC.3
Tube rack compatible with vials		X				2	Approved in EC-47/DEC.9
Evacuated glass container (vacutainer) 10ml		X				10	
Vacutainer needle 20G		X				10	
Vacutainer needle safety holder		X				10	
PTFE tubing 16G		X				50m	
Weights for tubing, Teflon-coated, 15 to 40g		X				10	
Tie-down strips, plastic		X				10	Approved in EC-36/DEC.2
Water-sample collection kit: Syringes, polypropylene, 60ml; three-way Luerlock valve, compatible with 10G tubing		X				8	Approved in EC-36/DEC.2
Liquid-sample collection kit: Syringes, glass, 10ml; three-way Luerlock valve, compatible with 10G tubing		X				8	Approved in EC-36/DEC.2 and EC-61/S/1/Corr.1
PTFE tubing 10G		X				50m	
Graduated pipettes, glass, 2ml		X				20	Approved in EC-47/DEC.9
Pipette ball for graduated pipettes		X				3	Approved in EC-47/DEC.9
Pasteur pipettes		X				1 pack	Approved in EC-47/DEC.9
Pasteur pipette bulbs		X				1 pack	Approved in EC-47/DEC.9
On-site sample transport container, stainless steel, air tight, with absorbent, compatible with OPCW seals	X	X	X	X	X	1	

Item	Solid Samples	Liquid Samples	Wipe Samples	Commonly Used Items	Air Samples	Approximate Number of Items	Changes from C-I/DEC.71 and Corr.1
Test-paper packages (chemical-agent detection) pH (0-14) paper				X X		1 package 1 package	
Spatula – stainless steel, approximately 15cm-long blade	X					10	
Scoop type spatula/spoon approximately 15 to 20cm long	X					6	Approved in EC-49/DEC.3
Aluminium foil, 30cm wide	X					1 roll	
Square boards (25cm)	X					5	Incorporated from original Attachment 12, Annex 8, Table 1 of C-I/DEC.71
Glove bag (approximately 100 x 100 x 60cm)	X					5	Incorporated from original Attachment 12, Annex 8, Table 1 of C-I/DEC.71
Mylar bags, heat sealable, 20 x 30cm				X	X	65	
Heat sealer, battery operated, capable of sealing 40-cm sheets				X	X	2	
Pre-extracted cotton cloth, 10 to 100cm sq.			X			10	
Hemostat (artery clamp) 10 to 30cm			X			5	
Locking telescopic extension			X			1	
Alligator clip to fit onto extension			X			5	
Pump, battery-operated, 0.5-5 L/min					X	6	
Flexible tubing, silicon					X	10 metres	
Conditioned tube containers, glass with glass wool and screw cap with elastomer seal					X	40	
Tube-sampling container, plastic with sampling caps with washer, and end caps with elastomer seal					X	20	
Manifold, 8-, 4-, or 2-tube capacity					X	4	
Digital gas-flow meter					X	1	Approved in EC-53/DEC.3
Air sample tube conditioner/preparation unit					X	1	Approved in EC-53/DEC.3
Voltage converter, 100-240 V					X	1	
Digital thermohygrometer					X	1	

Item	Solid Samples	Liquid Samples	Wipe Samples	Commonly Used Items	Air Samples	Approximate Number of Items	Changes from C-I/DEC.71 and Corr.1
Tubes, Tenax, capable of being fitted with end caps					X	20	
Tubes, Carbopak, capable of being fitted with end caps					X	20	
Tubes, Carbotrap, capable of being fitted with end caps					X	20	
Tubes, Haysep, capable of being fitted with end caps					X	20	
Knife, multi-tool				X		1	
Disposable scalpel with a fixed blade	X					3	Approved in EC-36/DEC.2
Scissors						2	
Pliers, needle-nose						1	
Tweezers, 10 to 30cm						5	
Safety goggles						2	
Gloves, nitrile, various sizes						2 x 10	Approved in EC-47/DEC.9
Bar-coded labels						200	
Bar-code reader						2*	
Tamper-indicating seals						300/roll	
Garbage bag, approximately 60 to 200 litres, chemically resistant				X		5	
Absorbent wipes, standard				X		1 box	
Bowl – stainless steel, 0.5- to 5-litre capacity	X					8	
Sieve – stainless steel, 1.70mm mesh, approximately 10cm (diameter)	X					8	
Permanent marker				X		2	
Packaging tape, 5 to 6cm wide				X		1 roll	
Duct tape				X		1 roll	Approved in EC-47/DEC.9
PVC tape, 1 to 3cm wide, various colours				X		3 rolls	
Tape to mark sample-preparation area (red and white)						2 rolls	Approved in EC-47/DEC.9
Bags, Ziploc-type, plastic, various sizes				X		2 x 20	Approved in EC-47/DEC.9

Item	Solid Samples	Liquid Samples	Wipe Samples	Commonly Used Items	Air Samples	Approximate Number of Items	Changes from C-I/DEC.71 and Corr.1
Stiff wire, 1.5 to 2.5cm			X		X	5m	Approved in EC-36/DEC.2
Forms, carbonless, duplicate						2 packs	
Adhesive labels, various sizes				X		1 pack	Approved in EC-47/DEC.9
Pens				X		3	
Clipboard				X		1	
Hacksaw				X		1	
Instant camera				X		1	
Films for instant camera				X		5 packs	
Explosion-proof flashlight				X		2	
Miner's lamp				X		2	
Measuring tape, chemical-resistant, 30m				X		1	
Ruler, plastic, 20cm				X		1	Approved in EC-36/DEC.2
Plastic, ground sheet, chemical resistant, 2m sq.				X		2	Approved in EC-36/DEC.2
Forward sampling box, approximately 50 x 40 x 20cm (disposable)				X		1	Approved in EC-36/DEC.2
Stock box				X		1	
Spare batteries for electrical equipment				X		1 set	
Umbrella, wind-resistant				X		2	

3. ALLEGED-USE SAMPLE-COLLECTION KIT

3.1 Operational requirements of alleged use sample-collection kit module for collection of biomedical samples:

In addition to the requirements in paragraph 2 above, the equipment:

(a) must allow for the collection, preservation, and safe transportation of biomedical samples;

(b) must allow for safe containment of sharp items and biologically contaminated items;

(c) must allow for field separation of serum, plasma, and red blood cells;

(d) must allow for biomedical sampling of at least 20 subjects;

(e) must provide blood-collection tubes for clotted and whole blood; and

(f) must enable relevant items to be packed sterile and maintained as such during storage and transportation.

3.2 Specifications of alleged-use sample-collection kit module for collection of biomedical samples:[9]

The standard kit must contain the items as specified below. Packaging must allow for the inclusion of additional equipment supplies that might be required for specific circumstances.

Item	No. of items
Portable centrifuge for blood-sample separation, either power or hand operated – 4-tube capacity	1
Portable fridge/freezer unit, with temperature recording ability and variable temperature control to a maximum of -10ºC	1
Scalpel handle (blade holder), no. 3	1
Forceps, haemostatic, curved, 15cm	2
Forceps, splinter, tweezers type	1
Forceps, tissue, toothed, 18cm	1
Scissors, general surgical, straight, one blunt point, one sharp point, 12.5cm	1
Scissors, general surgical, straight, two sharp points, 12.5cm	1
Scissors, heavy duty trauma, 12.5cm	1
Needle holder, straight, 15cm	1
Kidney dish, stainless steel, 15cm	1
Dish, stainless steel, rectangular, approx. 25cm x 10cm x 3cm	1
Tourniquet	2
Splash-protection goggles	2
Tight-sealing container for preservative/sterilising fluid, 1 litre	3

[9] This kit is still under development by the Secretariat.

Item	No. of items
Robust container for transport of kit	1
Approved container for transporting ambient or frozen biological specimens, capable of being used with OPCW seals	5
Sterile surgical gloves, sizes 7, $7^{1/2}$, and 8	4 (of each size)
Disposable surgical mask	4
Disposable plastic apron	2
Plastic urine-collection bottles	25
Evacuated glass blood-collection tubes for clotted blood, 10ml	25
Evacuated glass blood-collection tubes for clotted blood, 5ml	25
Evacuated glass blood-collection tubes for whole blood, EDTA, 5ml	25
Evacuated glass blood-collection tubes for whole blood, heparinised, 5ml	25
Evacuated glass blood-collection tubes for the separation of blood	25
Bottles: Glass, clear, wide-mouthed, with Teflon-lined screw caps, 25ml	10
Bottles: Glass, clear, wide-mouthed, with Teflon-lined screw caps, 100ml	10
Glass slides for preparation of blood smears	50
Cover slips for slide preparations	1 box
Plastic holder for prepared slides, screw top	2
Sterile needles for vacutainer closed blood-collection system	25
Needle and tube holder for vacutainer collection system	4
Sterile needles, 18-gauge and 21-gauge	10 (of each size)
Sterile syringes, 2ml, 5ml, 10ml	10 (of each size)
Sterile syringes, 20ml	5
Glass transfer pipettes with suction top	10
Dressing sheet, 60 x 80cm	2
Sterile throat swabs	20
Tongue depressors	10
Alcohol swabs for skin cleansing	25
Soap, liquid, anti-microbial (100ml in plastic bottle)	1
Elastoplast, band-aid type	25
Elastoplast, roll, 6cm width	1
Bags, sealable, 20 x 30cm	25
Tamper-indicating seals	1 roll
Self-adhesive labels	5 sheets
Clipboard	1
Pens, indelible, ball-point	2
Pens, permanent white board type	2
Scalpel blades, sizes 10, 12, 22	2 each
Suture pack (assorted sterile sutures)	1
Skin biopsy unit	1
Lumbar puncture unit	1
Container for safe containment of sharp items	1
Containers for the safe primary containment of samples	20
Plastic garbage bags	2
Sterilising fluids	1 litre
Preservative solutions	1 litre
Brush (for cleaning instruments)	1
Administrative package catering for medico-legal, religious, ethical, and chain-of-custody considerations*	1

* Still under development by the Secretariat.

4. SAMPLE-COLLECTION KIT FOR MUNITIONS

4.1 General requirements of the sample-collection kit for munitions:

In addition to the requirements in paragraph 2 above, the equipment must:

(a) be able to provide access to the interior of a chemical munition in a safe way;

(b) enable the acquisition and collection of a sample-size of at least 25mg of the contents of the chemical munition;

(c) allow for safe and easy closure of the sampled chemical munition and for decontamination after sampling;

(d) provide for the safe subsequent storage of the sampled item in case it is not promptly destroyed;

(e) allow for hermetic sealing of the sample-collection area during opening of the chemical munition with safe release or containment of the fill, including in the case of excess pressure;

(f) be equipped with an environmental-protection chamber;

(g) be portable;

(h) be applicable for various types of chemical munitions having different wall thicknesses;

(i) have an opening device capable of remote operation;

(j) be designed to be easily cleaned/decontaminated; and

(k) have a limit of opening depth capable of being preset.

4.2 Specifications for the sample-collection kit for munitions:

(a) The kit must contain the means for the sampled item to be sealed, so that there is no consequent loss of the structural integrity of the sample. It is desirable that the sealing system should remain intact for a period of not less than 15 years.

(b) The opening device must operate through a sealing system to prevent the release into the atmosphere of the contents of a chemical munition, but in a manner that allows for samples to be taken. The device must be capable of withstanding an internal over-pressure of up to 0.5MPa.

(c) The environmental-protection chamber must be capable of enclosing the whole chemical munition or the area of operation in which a chemical munition is being examined, but with provision to vent to the atmosphere through absorption media. The maximum volume should be approximately 1m³, with a target weight of 5kg. Surfaces should be chemically resistant. Provision must be made for essential operations to be carried out in the chamber through the use of glove ports and chemically-resistant fittings. This item must include a pressure test to prove the integrity of sealing before use.

(d) The mass of each module of the kit should not exceed 50kg (that is, be portable by two persons).

(e) The kit must enable the opening chemical munitions made of various materials or combinations of these materials with wall thicknesses from 1mm to 25mm and must have a limit of opening depth capable of being preset in increments not greater than 1mm. The diameter of the hole to be opened must be compatible with the sampling equipment.

(f) The opening device must be capable of being operated from a distance of at least 300 metres.

(g) It is desirable that the kit, for the purposes of decontamination and cleaning, should be capable of being dismantled within one hour by one person wearing full protective gear.

(h) A means for carrying out sampling must be provided. For the sampling of liquids, the kit must have the capacity for samples in the range of 0.9 to 1.9g/cm³ for absolute density and 1.0 to 1000cP for viscosity to be taken.

(i) For liquid agents, the sampling means must allow for at least 10 samples in the range of 10mg to 100mg each to be taken.

(j) It is desirable that the preparatory stage and sampling from a single chemical munition should not take more than one hour and that the time span for sampling should not exceed 30 minutes.

(k) The kit must enable the sampling of at least three munitions during a single inspection to take place.

(l) The kit must be operable with 50 to 60Hz, 100 to 240 (± 10%) VAC line with step voltage capability. The upper power requirement limit should be 1.5kW.

(m) The kit must be supplied in carrying/transportation cases fitted out to hold the component parts. The cases shall be fabricated in aluminium, with an airtight lid, lock, and with carrying handles at each end. The target weight should be approximately 5kg.

5. GC-MS SAMPLE-PREPARATION KIT

5.1 General operational requirements of GC-MS sample-preparation kit:

The equipment is required for the preparation of samples for analysis on site. The equipment must be able to support the processing of a variety of samples and must allow sample preparation for the analytical inspection equipment brought along by the inspection team (GC-MS, FTIR, screening kits).

The kit must:

(a) be used in accordance with sample preparation procedures that are "robust", in that these procedures should enable the analysis of a wide variety of chemicals relevant to the Convention, even though these procedures are not optimised for any one analyte;

(b) have procedures for specific chemicals relevant to the Convention;

(c) have procedures that eliminate the need for equipment items without seriously decreasing the efficiency by which the sample is prepared;

(d) be used according to procedures that decrease the time required for analysis without seriously decreasing the efficiency with which samples are prepared;

(e) be used in accordance with sample-preparation procedures and contain equipment that is designed to protect the safety of the inspector-analyst, and the inspected site and its personnel;

(f) indicate any "special" equipment or reagents, i.e. other than normal laboratory glassware, etc.;

(g) minimise the generation of hazardous waste;

(h) easily enable major equipment items to be decontaminated;

(i) be in accordance with decisions by expert groups as to whether it is necessary for some items and/or materials to be left at the inspection site for reasons of safety and/or confidentiality; and

(j) be self-sufficient, to the extent possible.

5.2 List of equipment/chemical items and specifications in GC-MS sample preparation:

The table below shows the contents of the GC-MS sample-preparation kit, which consists of enough items for the analysis of approximately six solid, liquid, air, and wipe samples to be carried out. If a larger number of samples are expected to be

taken, the contents of the kit must be modified accordingly. These items will be packaged in suitable shipping containers.

REUSABLE ITEMS	Approximate Number	Changes from C-I/DEC.71 and Corr.1
Fume hood fulfilling the present internationally recognised requirements set for fume hoods, such as DIN, OSHA (US) and BSI standards[10]. Normal linear airflow velocity at the face should be over 0.5 m/s (measured in compliance with BSI DD80 or equivalent) with an internal volume of less than $1m^3$	1	
Nitrogen cylinder with regulator and tubing (or equivalent generator) for heater/evaporator	1	Approved in EC-47/DEC.9
Heater/evaporator with separate aluminium heating blocks (three sizes compatible with the vials) and 9-position nitrogen purge concentrator with tubing for connection to nitrogen generator	1	Approved in EC-36/DEC.2
Top loading balance, electronic, with capacity 0 to 200g, precision $\pm$ 0.1g	1	
Centrifugal evaporator, with rotor compatible with 25ml glass centrifuge tube	1	Approved in EC-36/DEC.2
Rotary vacuum pump with water trap for centrifugal evaporator	1	Approved in EC-36/DEC.2
Solid phase-extraction (SPE) 12-port vacuum manifold with vial holder compatible with the vials	1	
Vacuum and pressure station for SPE 12 port vacuum manifold	1	
Trap kit for SPE 12-port vacuum manifold	1	
Adjustable pipette, 0.5 to 5ml	2	
Adjustable pipette, 2 to 10ml	2	
Bar-code reader	1	
Centrifuge compatible with 15ml glass centrifuge tube	1	Approved in EC-36/DEC.2
Tube rack compatible with centrifuge tubes	1	
Tube rack compatible with the vials	1	Approved in EC-36/DEC.2
Digital alarm timer	1	
Refrigerator/freezer, portable, with battery pack and recharger	1	Approved in EC-36/DEC.2
Ultrasonic bath, small size	1	Approved in EC-47/DEC.9

[10] DIN = Deutsches Institut für Normung; OSHA = Occupational Safety and Health Administration (United States of America); and BSI = British Standards Institute

DISPOSABLE ITEMS[11]	Approximate Number	Changes from C-I/DEC.71 and Corr.1
Beaker, glass, 50ml	6	
Glass vials/bottles with screw caps with inert elastomer seals, sizes ranging from 1 to 100ml	Various numbers	Approved in EC-57/DEC.2
Glass insert compatible with 4ml glass vial, 0.35ml (approximately)	20	
Graduated cylinder, glass, 10ml	20	
Automatic pipettes	2	Approved in EC-47/DEC.9
Automatic pipette tips	2 boxes	Approved in EC-47/DEC.9
Pipette tip, for adjustable pipette (0.5 to 5ml)	40	
Pipette tip, for adjustable pipette (2 to 10ml)	40	
Syringe, polypropylene, luer lock, 10ml	100	
Syringe filter, polypropylene, 25mm diameter, 0.45 micrometre pore size with binder-free glass fibre pre-filter	100	
Sterilisation filter unit, nylon, 200ml, 0.45 micrometre pore size	20	
Syringe, glass, 500-microlitre	6	
Filter paper, Whatman number 4, diameter 90mm for funnels	1 pack	
Funnel, short stem, diameter 5cm	50	
SPE cartridge, SCX, 500 mg/3ml	20	
SPE amino cartridge, NH_2 100mg/1 ml	20	
SPE cartridge, C18	1 box	Approved in EC-47/DEC.9
SPE cartridge, silica gel	1 box	Approved in EC-47/DEC.9
SPE cartridge, Ambersorb 572 or equivalent	20	Approved in EC-36/DEC.2
SPE cartridge, strong anion exchange (SAX)	20	Approved in EC-53/DEC.3
Adapter for SPE cartridge, compatible with SCX/NH2 cartridge and 10ml polypropylene syringe	40	
Outlet needles	24	Approved in EC-36/DEC.2
Spare stopcocks for SPE 12-port vacuum manifold	12	
Screw cap, silicon/Teflon-coated septum, various sizes	100	Approved in EC-47/DEC.9
Stainless steel needles compatible with 9-position nitrogen purge concentrator	9	Approved in EC-36/DEC.2
Replacement tubing for 6-position nitrogen purge concentrator	1m	
Hose clamps compatible with the tubing for 6-position nitrogen purge concentrator	4	
Centrifuge tube, glass, 25ml	50	
Centrifuge tube with plug seal cap, glass, 15ml, rated to 3000G	50	Approved in EC-36/DEC.2
Glass rod, 5mm x 200mm	5	Approved in EC-36/DEC.2

[11] These items are replacement components used to replenish the kits.

DISPOSABLE ITEMS[11]	Approximate Number	Changes from C-I/DEC.71 and Corr.1
Metal rod, small	1 piece	Approved in EC-47/DEC.9
Transfer pipette bulbs, rubber	1 pack	
Transfer pipette, glass, short neck, 2ml	1 pack	
pH paper, 0-14, various pH ranges	One package from each range	Approved in EC-57/DEC.2
Beaker, 1000ml and 2000ml	4	Approved in EC-36/DEC.2
Waste bottle, wide mouth, volume 2 litres with chemical-resistant lid	1	
Waste bottle, wide mouth, volume 4 litres with chemical-resistant lid	1	
Wash bottle, polyethylene, 250ml	2	
Forceps, stainless steel	5	
Spatula, stainless steel, different shapes and sizes	12	Approved in EC-36/DEC.2
On-site sample-transport container, stainless steel, with inside plastic containers, airtight, with absorbent	1	Approved in EC-47/DEC.9
Tray, various sizes	10	Approved in EC-47/DEC.9
Barcode label (with also alphanumeric readout)	1 pack	
Adhesive labels, different sizes	1 pack	Approved in EC-36/DEC.2
Sample-preparation form, carbonless, duplicate	1 set	
Clipboard for sample-preparation form	1	
Laboratory notebook	1	
Pens, permanent, different colours	2	Approved in EC-36/DEC.2
Markers, permanent	4	
Pair of scissors	1	
Sealing film	1 pack	
Absorbent wipe, standard	2 boxes	
Laboratory coat	2 coats	
Power strip	3	Approved in EC-47/DEC.9
Extension cord with 3-way electrical sockets	3	Approved in EC-36/DEC.2
Multi-plug adapter	5	Approved in EC-47/DEC.9
Tape, Teflon, 1 to 2cm	2 rolls	Approved in EC-47/DEC.9
Tape to mark sample-preparation area (red and white)	2 rolls	Approved in EC-47/DEC.9
Absorbent lab-bench paper roll	1	Approved in EC-36/DEC.2
Waste bags	10	Approved in EC-36/DEC.2

DISPOSABLE ITEMS[11]	Approximate Number	Changes from C-I/DEC.71 and Corr.1
Gloves, nitrile, different sizes	2 boxes	Approved in EC-36/DEC.2
Signs to mark sample-preparation area	4	Approved in EC-36/DEC.2

CHEMICAL REAGENTS AND QUALITY CONTROL STANDARDS	Approximate Quantity	Changes from C-I/DEC.71 and Corr.1
Detergent, phosphate free	1 litre	Approved in EC-36/DEC.2
Decontamination solutions	2 x 1 litre	Approved in EC-47/DEC.9
Activated carbon	0.5kg	Approved in EC-36/DEC.2
Water, HPLC grade	1 litre	Approved in EC-36/DEC.2 and EC-61/S/1/ Corr.1
Dichloromethane, gas-chromatographic grade	1 litre	Approved in EC-36/DEC.2
Hexane, gas-chromatographic grade	50ml	Approved in EC-36/DEC.2
Methanol, gas chromatographic grade, 99.8%	1 litre	Approved in EC-36/DEC.2
Acetonitrile	100ml	Approved in EC-36/DEC.2
Tetrahydrofuran (THF)	100ml	Approved in EC-53/DEC.3
Triethylamine (1%, v/v) in methanol	250ml	Approved in EC-47/DEC.9
N,O-bis-(trimethylsilyl)trifluoroacetamide (BSTFA)	20ml	
N,N-Dimethylformamide	100ml	Approved in EC-36/DEC.2 as 5ml, but since it can be used as a replacement for Acetonitrile, the quantity should be increased
N,N-Dimethylformamide dimethyl acetal	10ml	Approved in EC-36/DEC.2
1,1,1,3,3,3-Hexamethyldisilazane	5ml	Approved in EC-36/DEC.2

CHEMICAL REAGENTS AND QUALITY CONTROL STANDARDS	Approximate Quantity	Changes from C-I/DEC.71 and Corr.1
Trimethylphenylammonium hydroxide solution in methanol	20ml	Approved in EC-53/DEC.3
0.1 N Hydrochloric acid, HCl, reagent grade	50ml	
2.0 N Hydrochloric acid, HCl, reagent grade	50ml	
Methanolic HCl	20ml	Approved in EC-53/DEC.3
0.1 N Ammonium hydroxide, NH4OH, reagent grade	500ml	Approved in EC-36/DEC.2
Ammonium hydroxide, NH4OH, 27-30% as ammonia, reagent grade	25ml	
Sodium sulphate, anhydrous, Na_2SO_4, reagent grade	250g	Approved in EC-36/DEC.2
3,4-Dimercaptotoluene (DMT)	7.5mg	Approved in EC-36/DEC.2 as a mixture of 5mg/ml in acetone, but due to stability problems should be stored separately and prepared onsite
Acetone	1.5ml	Solvent to be mixed with DMT to form 5 mg/ml solution, see comment above
1-Butanethiol, 5 mg/ml in hexane	5ml	Approved in EC-47/DEC.9
Hexachlorobenzene, 50 µg /ml (micrograms per millilitre) in dichloromethane	2ml	Approved in EC-36/DEC.2
Test mixture containing 10 µg/ml (microgram per milliliter) each in dichloromethane of: • Trimethylphosphate • 2,6-Dimethylphenol • 5-Chloro-2-methylaniline • Tri-n-butylphosphate • Dibenzothiophene • Malathion • Methylstearate • N-alkanes (C8 to C24, even numbers: octane, decane, dodecane, tetradecane, hexadecane, octadecane, eicosane, docosane, tetracosane)	4ml	Approved in EC-36/DEC.2

6. FOURIER TRANSFORM INFRARED SPECTROMETER (FTIR)

6.1 General operational requirements:

The portable FTIR spectrometer to be used during on-site inspections must provide, subject to the general operational requirements for inspection equipment, the capability for the detection and identification of chemical compounds relevant to the purposes of the inspection. The portable FTIR spectrometer must:

(a) be capable of analysing compounds relevant to the Convention;

(b) be equipped with sample-introduction techniques for solids, liquids and, desirably, gases;[12]

(c) contain data-comparison libraries that are limited to chemicals relevant to the Convention;

(d) be configured in such a manner that[13] all the data in the non-volatile memory must be retainable at the inspected site under the joint custody of the Secretariat and the ISP;

(e) be sufficiently sensitive so that materials in the aliquot introduced into the instrument can be identified;

(f) be operable in a variety of modes, in order that intrusion can be minimised;

(g) have sufficient resolution in order that target materials from background and interfering chemicals can be distinguished;

(h) meet the safety requirements of the environment in which it is to operate;

(i) be ruggedised and modularised for transportation with modules that can be carried by two persons;

(j) minimise the requirements for electrical power and consumables, e.g. pressurised gas and cryogenic liquids;

(k) have a short repeat-analysis time;

(l) be operable by one person;

(m) be operable independently of inspection site support for the duration of the inspection;

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[12] The Secretariat does not want to limit itself just to bench-top models and is looking for more modern, fieldable, and deconable models on the market that may not have gas capability.

[13] It is impossible to do this with the current available FTIR unit.

(n) be operable over the range of temperatures expected during all inspections; and

(o) be capable of complete decontamination, if necessary.

6.2 **Physical features:**

(a) Weight: maximum weight per module should not be greater than 30kg, including overpacks (less than 15kg is desirable);

(b) Size: maximum length in any dimension shall be 1.2m, including overpacking;

(c) Power requirement:

(i) operable with 50 to 60 Hz, 100 to 240 (± 10%) VAC line with step voltage capability or be operable from transformers; ideally should be capable of running on a rechargeable battery;

(ii) should draw a maximum power of 2kW;

(iii) must be operable from portable power supplies; and

(iv) should ideally be operable on self-contained battery power for at least one hour.

(d) Overpack: must be provided with transport appliances.

6.3 **Operational features:**

(a) The system must be capable of being set up and ready for operation (be unpacked, assembled, and calibrated) in a time not to exceed 20 minutes:

(i) it must be operable by one person; and

(ii) it must be capable of being set up by no more than two people.

(b) The system:

(i) must be capable of continuous operation for a period of 24 hours;

(ii) have a warm-up time not exceeding 30 minutes at an ambient temperature of 25°C;

(iii) be able to be dismantled and repackaged for transport in no longer than two hours; and

(iv) operate in temperature extremes from 10°C to 40°C.

6.4 **Specifications for the infrared spectrometer:**

(a) a minimum resolution of 4 cm^{-1};

(b) a minimum spectral range of 400 to 4,000 cm^{-1};

(c) a user-replaceable source that does not need realignment within a time frame of 30 minutes[14];

(d) an accuracy maximum variance of ± 1cm^{-1} from calibration peaks of polystyrene;

(e) a S/N measure at 2,000cm^{-1} by comparison to the strongest peak in the spectrum (1,601cm^{-1} in polystyrene) using a TGS detector, triangular apodisation; the 4-second scan time and resolution 4cm^{-1} must be greater than 2,000/1;

(f) the transmittance mode-sample holders will include those for:

(i) solid samples: potassium bromide (KBr) salt discs (a compatible KBr press to produce the discs is to be provided);

(ii) liquid samples: thin film capability using KBr windows; and

(iii) gas samples: 10 to 20cm fixed-path tubes fitted with appropriate inlet and outlet ports and equipped with KBr windows.

(g) a ventilated sample compartment; the pumping system is to be protected by charcoal adsorber.

6.5 **Software features:**

(a) The software must support the management of spectrometer operations, the testing of the device and the auto-detection of faults, the reconstruction of the absorption and transmission spectra from the interferogram, the segregation of the spectra fragments, mathematical manipulations with the spectra, and the printing and plotting of spectra. The software must include the database of the FTIR spectra of the chemical agents listed in Schedules 1, 2, and 3.

[14] This needs to be rewritten by the Analytical Task Force Group of the Secretariat in order to reflect the newer fieldable models.

(b) The software must include a special search programme for the identification of chemical agents, and for comparing experimental IR spectra with the spectra in the database. The instrument data format must be compatible with the formats available in the OCAD.

(c) The software must provide two semi automatic modes of analysis:

(i) a spectra-matching algorithm; and

(ii) a spectral-base search algorithm.

(d) The software should be capable of allowing a "present/absent" type of response.

6.6 **Instrument operator-training system:**

Training software for instrument operations is desirable for data acquisition and data manipulation. It is desirable that the software operate independently of the analytical instrument.[15]

6.7 **Special features of the software that is connected with inspection activity:**

(a) To ensure that confidentiality is maintained, the software must enable the field of search to be restricted and must permit searches to be made only among those substances connected with the inspection that is taking place at that time; it must exclude a search of all other substances present in the spectral library.

(b) The software must exclude the possibility of the device being tampered with. All tampering must be indicated by the software. The software should enable the self-testing of the device on a permanent basis and enable the periodic checking of its meteorological characteristics.

[15] There should be no differences between the training software and the on-site software.

7. FTIR SAMPLE-PREPARATION KIT

List of reagents/materials and specifications of the FTIR sample-preparation kit for on-site IR analysis[16]:

Reagents and Materials	Solid Samples	Liquid Samples	Vapour/ Gas Samples	Total Number of Items
Fume hood, fullfilling the present, internationally recognised requirements set for fume hoods, such as DIN-, OSHA (US) and BS standards. Normal linear airflow velocity at the face should be over 0.5 m/s (measured in compliance with BSI DD80 or equivalent), with an approximate size of 50 x 50 x 50cm	X	X	X	1
"Glove bag" plastic disposable type (approximate size: 45 x 45 x 30cm with equipment opening of approximately 20cm)	X			10
Powdered KBr (spectrometer grade)	X			5g
Mortar (approximate size of 8cm) and pestle	X			5
Die system (specadie type) airtight end caps	X			5
Filter paper (12.5cm diameter)	X	X	X	1 box
Spatula (10cm, disposable)	X	X		10
Beaker, plastic, 500ml	X	X	X	1
Hemostat (artery clamp) 20cm	X	X	X	1
Ethanol (absolute)	X	X	X	1 litre
Potassium hydroxide (reagent grade)	X	X	X	40g
Vacuum pump (dry non-lubricated, capacity of approximately 350mm Hg, weight < 10 kg)	X		X	1
KBr discs (2cm minimum diameter)		X		20
Disc holder (compatible with spectrometer cell compartment and KBr discs)		X		2
Glass pipette (disposable)		X		50
Disc polishing kit (abrasive/cloth)	X	X	X	1 kit
Desiccator (approximately 50 x 30 x 30cm) with self-indicating dessicant	X	X	X	1
Airtight disc holder (compatible with the spectrometer compartment and allows normal operation)		X		2
Gas cell (10cm pathlength)			X	2
Gas cell holder (compatible with gas cell and spectrometer)			X	1
KBr discs (compatible with gas cell)			X	10
Gas cell seals (for gas cell)			X	10 sets
Hand bellows (air pump)			X	1
Ventilation unit (compatible with instrument and sample containers)	X	X	X	1

[16] Components of the FTIR preparation kit must be revised by the Secretariat's Analytical Task Force Group to include newer fieldable models.

8. SAMPLE-TRANSPORT KIT

8.1 Purpose:

The sample-transport kit transports samples related to the Convention on commercial passenger and cargo aircraft in accordance with International Civil Aviation Organization (ICAO) packing instruction 623, section (a).

8.2. Operational requirements:

(a) The kit must be designed in such a way as to allow safe transport of toxic chemicals as defined in ICAO technical instructions, listed as ID No. 8003 "Chemical samples, toxic, liquid or solid" under United Nations number 3315.

(b) Each container must allow for the incorporation of features, such as security seals, and coatings or wraps to provide an indication of tampering.

(c) The outer case must be equipped for easy handling by two persons.

(d) The outer case must protect the inner packaging to reduce the effects on samples of mechanical shock and challenges posed by heat.

8.3 Specifications:

(a) The kit must meet the test criteria laid down by the ICAO for air transport, particularly those contained in section (a), "Packing Instruction 623".

(b) The kit must be composed of at least a primary container, a secondary container, a tertiary container, and an outer case.

(c) The outer case must be capable of being locked.

(d) The kit, including accessories and tools, must not exceed 50kg.

Appendix 4

NON-DESTRUCTIVE EVALUATION (NDE) EQUIPMENT: OPERATIONAL REQUIREMENTS AND SPECIFICATIONS

1. ACOUSTIC-RESONANCE SPECTROSCOPY (ARS)

1.1 General requirements of ARS and all other NDE equipment:

The NDE equipment must:

(a) be ruggedised for transportation and field operation;

(b) meet all safety requirements for its intended area of operation;

(c) be rugged enough, in transportation configuration, to withstand the rigours of transport by aircraft and wheeled vehicles;

(d) meet international and State Party requirements for packaging and transport;

(e) be capable of safe operation in a chemical and explosive environment with fused, bustered, and propellant-filled munitions and containers. Electromagnetic and ionising radiation must be able to be easily shielded/housed, so as to preclude the possibility of any hazards arising;

(f) be capable of being broken down into modules that can be carried by two persons;

(g) be configured in such a manner that data acquisition, storage, and library-comparison hardware and software are independent of, and separable from, the instrument controller hardware and software. All data in the non-volatile memory must be retainable at the inspected site under the joint custody of the Secretariat and the ISP, when appropriate;

(h) be designed for the rapid screening of items;

(i) enable the contents of closed containers to be examined;

(j) have an automatic data recognition and decision algorithm, when applicable;

(k) have displays that are readable in direct sunlight and in dim light;

(l) be operable over the range of temperatures expected during all inspections;

(m) be operable by inspectors wearing full chemical-protective gear;

(n) be able to discriminate between the contents of like items;

(o) be operable by no more than two persons; and

(p) be accompanied by radiation detection and monitoring equipment for health- and-safety requirements.

1.2 **Specific requirements for other acoustic NDE equipment:**

(a) The equipment must be able to discriminate between solid and liquid-filled munitions with an acceptable degree of accuracy.

(b) It must be able to determine the fill level of a container.

(c) It must have power requirements consistent with battery operation.

(d) Contaminated parts must, in the event of chemical contamination, be capable of being decontaminated or disposed of in accordance with environmental and safety requirements.

1.3 **Specific requirements for the ARS:**

The equipment must:

(a) be able to sort like items by means of a comparison of acoustic spectra with an acceptable degree of confidence; and

(b) be able to be carried and operated by one person.

1.4 **Functional specifications for the ARS:**

The following functional specifications describe the minimum requirements necessary for equipment designed to interrogate closed containers with acoustic resonance to obtain information about the contents.

(a) Performance:

(i) It must be able to discriminate between solid-filled and liquid-filled munitions at a confidence level of at least 95%.

(ii) It must be able to sort like items by comparison of acoustic spectra at a level of accuracy of at least 95%.

(b) Transport:

The ARS must be transportable, weighing no more than 20kg.

(c) Operational environment:

(i) The ARS must be able to operate on a battery for an uninterrupted period of eight hours.

(ii) The operational reliability should be at least 500 hours between failures.

(iii) The equipment must be capable of being set up within 15 minutes.

(iv) The measurement time to evaluate an item should not exceed five minutes.

(v) The equipment must be configured to allow for evaluation of individual items, items on pallets, and items on stacked pallets.

(vi) The data must be displayed in near real time.

(vii) The ARS must be able to discriminate signals from ambient acoustic/vibration levels.

2. ULTRASONIC PULSE-ECHO (UPE)

2.1 Specific requirements:

The equipment must:

(a) be able to meet all requirements listed in paragraphs 1.1 and 1.2 above;

(b) be able to sort like items by comparison of sound propagation time with an acceptable degree of confidence;

(c) be able to determine the liquid-fill level of a container, under normal operating conditions; and

(d) be able to be carried and operated by one person.

2.2 Functional specifications:

The following functional specifications describe the minimum requirements necessary for the equipment that has been designed to interrogate closed containers with acoustic pulses in order that information about the contents can be obtained.

(a) Performance:

It must be able to determine the liquid-fill level of a container, independent of the container's characteristics or material, to within $\pm$ 2% in relation to the long axis of the container.

(b) Transport:

The UPE must be transportable, weighing no more than 10kg.

(c) Operational environment:

(i) The equipment must be able to be battery operated for an uninterrupted period of at least two hours.

(ii) Its operational reliability should be at least 500 hours mean time between failures.

(iii) It must be capable of being set up within 15 minutes.

(iv) The measurement time to evaluate items should not exceed 10 minutes per item.

(v) It must be configured to allow for evaluation of individual items, items on pallets, and items on stacked pallets.

(vi) The data must be displayed in near real time.

(vii) The equipment must be able to discriminate signals from ambient acoustic/vibration levels in industrial facilities.

3. NEUTRON-INDUCED PROMPT-PHOTON SPECTROSCOPY (NIPPS)

3.1 Specific requirements of all neutron-interrogation (NI) methods:

The equipment must:

(a) be able to meet all the requirements in paragraph 1.1 above;

(b) have levels of emitted radiation, such that shielding is not required to limit exposure to safe levels at a reasonable stand-off;

(c) be capable of detecting chemical elements and/or ratios of chemical elements in chemicals related to the Convention;

(d) be designed to minimise the need for cryogenic cooling; and

(e) not induce secondary radiation of the nature and level which are incompatible with national and local health-and-safety regulations.

3.2 **Functional specifications:**

(a) The equipment may also be used to check for the "presence/absence" in sealed containers of the elements of phosphorus, sulfur, arsenic, nitrogen, and chlorine, and, to the extent possible, the elements of carbon, hydrogen (hydrogen is one of the easiest to detect alongside sulfur, chlorine, etc.), fluorine, bromine, and iodine and the ratios of all these elements. Special software running on a portable computer is required to process and display the prompt photon energies relating to these elements.

(b) The following functional specifications describe the minimum requirements necessary for equipment designed to interrogate closed containers with neutrons to obtain information about their contents.

3.3 **System requirements:**

(a) Performance:

(i) It must be capable of detecting the elements phosphorous, sulfur, arsenic, nitrogen, chlorine, and hydrogen, with an accuracy in determining the phosphorus-sulfur (P-S) ratio of better than 20%.

(ii) The detection of the elements carbon, hydrogen, fluorine, bromine, and iodine would be desirable, and allow the establishment of element ratios similar to those under (3.2(a)) above.

(iii) It must, at a 95% level of accuracy, detect the designated isotopes at an isotope concentration of 5% in a sample volume of one litre.

(b) Transport and storage:

(i) It must be transportable, with no module weighing more than 35kg, including the overpack.

(c) Safety:

(i) The emitted radiation at a stand-off distance of 25 metres shall not exceed 0.01 mrem/hr (0.1 μSv/hr).

(d) Operational environment:

(i) The power requirements must be compatible with portable generators and there must be alternate, rechargeable battery source(s).

(ii) The operational reliability should be at least 150 hours mean time between failures.

(iii) It must be capable of being set up within one hour.

(iv) Under normal circumstances (non-overpacked items), the measurement time to evaluate items should not exceed 30 minutes.

(v) It must be configured to allow for evaluation of individual items, items on pallets, and items on stacked pallets.

(vi) The data must be displayed in near real time.

(e) Component requirements:

Neutron source

(i) The neutron source must be usable by personnel trained as radiation workers, without undue hazards being posed to the operator or to other nearby personnel.

(ii) If an isotopic source is used, the sealed source form should be doubly encapsulated.

(iii) If an accelerator source is used, radio frequency (RF) emittance must be minimised.

(iv) The manufacturer accepts the return of the source, and parts of the equipment that carry residual radiation at the end of their useful life.

Gamma-ray detector

(i) The detector should operate at a peak efficiency of 40% or more for the cobalt-60 1332 keV gamma ray, relative to a 7.62cm x 7.62cm (3" x 3") NaI (T1) detector.

(ii) It must have an energy resolution sufficient to detect a P/S ratio under field conditions.

(iii) If cryogenic cooling is required, it must have a portable cryostat configuration, with a 24-hour liquid nitrogen holding time.

Electronic/multichannel analyser (MCA) system

(i) Integrated electronics/MCA in one package is desirable.

(ii) Data display, MCA control, and data storage by notebook-size computer is desirable.

(iii) The connection to the computer must enable data to be quickly transferred for live display.

(iv) It must be capable of an analog digital converter (ADC) conversion time of five microseconds or less.

Computer software

(i) It must contain fully automated decision algorithms and instructional menus.

(ii) The electronic-storage media should be removable.

(iii) The software must be printer compatible.

(iv) Only gamma energies relevant to the inspection shall be processed and stored.

Instrument operator-training system

(i) The training software on data acquisition and data manipulation for instrument operations must be provided to operators. It must operate independently of the analytical instrument.

(ii) All data-manipulation software must be fully capable of processing the same types of data as those collected using the analytical instrument.

(iii) The training software must have simulated data-acquisition modes, with realistic examples of instrument control, instrument-parameter display, and data display.

(iv) Training equipment for instrument operations must be provided for instrument setup, data acquisition, and data manipulation. It must operate independently of the radiation source and the detector.

4. HYDROGEN CONCENTRATION MEASUREMENT/CHLORINE DETECTION SYSTEM (HCM/CDS)

4.1 Functional specifications:

(a) The HCM, which is thermal neutron-based NDE equipment, must be able to discriminate, on the basis of their hydrogen concentration, between munitions/containers filled with hydrogen-containing substances and those that are not.

(b) The CDS (based on neutron capture gamma-ray) is a complementary system that must be operated in tandem with the HCM. It must be capable of discriminating between munitions/containers filled with chlorine-containing substances and those that are not, on the basis of the difference in their chlorine concentration.

(c) The HCM-CDS must use the same support accessories and components (a neutron source, a computer, radiation protection/monitoring equipment etc.). The HCM-CDS combined system should be considered a subsystem of the general neutron-interrogation method. As such, the kit's overall transport, safety, operational environment, components, and instrument operator training system specifications and requirements are the same as those applicable to the NIPPS described in paragraph 3.1 above.

4.2 **Specific requirements:**

(a) The equipment should be able to discriminate between explosive-filled conventional munitions and munitions/containers filled with hydrogen containing chemical-warfare agents.

(b) It must be configured to allow for the evaluation of individual items, items on pallets, and items on stacked pallets.

(c) The data must be displayed in real time.

(d) The levels of emitted radiation must be sufficiently low, so that shielding is not required to limit exposure to safe levels at a reasonable stand-off distance.

(e) The HCM counter/timer unit must be able to be operated as a rate meter or as a hydrogen-concentration meter.

(f) Power requirements must be compatible with portable generators, and there must be alternate, rechargeable battery source(s).

4.3 **Functional specifications:**

(a) <u>Performance</u>:

(i) The equipment must be capable of determining the hydrogen/chlorine concentration within the fill of munitions items or other containers with a relative accuracy of better than 10% within one minute for the HCM and within 10 minutes for the CDS.

(ii) The measurement time to display the hydrogen/chlorine concentration should not exceed one minute for the HCM and 10 minutes for the CDS.

(iii) The HCM must be capable to determine, within one minute, the fill level of a hydrogenous substance in a container, based on the localisation of its interface.

(b) Transport:

(i) The equipment must be portable by one person with no module exceeding 10kg (including the overpacking).

(ii) The packaging must meet ICAO requirements for air transportation.

(iii) The operational reliability must be at least 150 hours mean time between failures.

(iv) The equipment must be capable of being set up within 20 minutes.

(v) The neutron source must be certified "special form" by the appropriate authorities in the country of origin. A Type A shipping container appropriate for this source must be furnished with it.

(c) Operational environment:

(i) Emitted radiation at a stand-off distance of one meter must not exceed 0.5mrem/h (5μSv/h).

(ii) The protection of the detector from direct radiation from the source must be equivalent to that of a tungsten block 40mm thick.

(iii) The instrument must be provided with two cables between the detector and the meter, one two metres in length, and the other 20m in length. The cables must be readily interchangeable under field operation conditions.

(iv) The instrument must allow for continuous operation on a battery for at least 24 hours.

(v) The manufacturer must accept return for recycling of the radiation source and parts of the equipment that carry residual radiation at the end of their useful life.

5. X-RAY EQUIPMENT

An X-ray method is used to confirm the internal nature of the munition in the absence of original tags, or when corrosion does not allow for a positive identification of an unopened munition. Additionally, an X-ray is able to quickly provide radiographic information, which enables the discrimination to take place between conventional or chemical munitions that are directly accessible or that are in an overpack.

5.1 **Specific requirements:**

(a) The X-ray equipment must be complete and in a single package; it must be a constant voltage or pulsed X-ray device for use in exposing conventional or Polaroid X-ray film, or in connection with a digital real-time imaging subsystem.

(b) The equipment must be operable in both 110/240 VAC line and VDC battery-powered mode. The battery should be self-contained, removable, and rechargeable.

(c) The instrument setup data must be displayed in real time.

(d) The equipment must have a built-in electronic counter for exposure control.

5.2 **Functional specifications:**

The following functional specifications describe the minimum requirements for equipment designed to perform radiography on closed containers to obtain information on their contents:

(a) Performance:

(i) The X-ray equipment must be capable of penetrating steel up to 40mm thick (and munitions casings that are 20mm thick) and must provide reliable images of the internal structure of the munitions, e.g. the presence/absence of a burster tube and the level of the munition.

(ii) An X-ray examination must yield adequate results in less than 15 minutes (including film-developing time when either Polaroid instant film or real-time digital imaging is used) to support on-site factual findings during an inspection.

(iii) The results must be of acceptable quality in sets of (at least) two identical radiographs usable by both parties.

(iv) The tube head subsystem must be able to cool air under standard ambient temperature conditions (20°C). An optional water-cooling capability is desirable.

(v) It must provide 100% duty cycle at standard ambient temperature conditions (20°C) for the longest exposure time expected during on-site inspections.

(b) Transport:

It must be ruggedised for transport, configurable in portable modules weighing no more than 70kg (per module); including the carrying case (less than 25kg is desirable).

(c) Operational environment:

(i) The electron beam accelerating voltage must be adjustable between 90 and 300 kV to avoid unnecessary generation of high X-ray output.

(ii) The electron beam current must be adjustable between 0.2 and 2.0 mA.

(iii) The focal spot size must be less than 5mm in diameter.

(iv) The electrical power consumption at full X-ray output must not exceed 3kW.

(v) The instrument must be provided with a cable of at least 20m for the connection of the X-ray head and the control unit.

(vi) It must be capable of being set up by a two-person team in less than one hour.

(vii) Accessory equipment and consumables must be readily available.

(d) Safety:

(i) The instrument must be provided with a key interlock system to allow safe operation and prevent the undue or unauthorised generation of an X-ray.

(ii) The instrument must have a two-position, time-delay switch that can be activated by a remote switch, so that the operator can stand off at a safe distance. It must also be capable of giving an external audible and visual signal that provides warning prior to and during the generation of X-rays.

(iii) The system must include X-ray beam collimation devices and sufficient primary beam-shielding material to avoid exceeding 0.01mrem/hr (0.1μSv/hr) outside an enclosure used for the X-ray instrument.

(iv) The system must include radiation-monitoring devices and subsystems for both area surveys (dose-rate meters) and personnel radiation safety monitoring (historical and electronic radiation dosimeters).

Appendix 5

HEALTH-AND-SAFETY EQUIPMENT: OPERATIONAL REQUIREMENTS AND SPECIFICATIONS

1. CHEMICAL WEAPONS (CW) PROTECTIVE OVERBOOTS (DISPOSABLE)

1.1 **Purpose:**

The protective overboots provide protection against CW agents and common industrial chemicals (e.g. acids, alkalis, and solvents) in solid, liquid, aerosol, or vapour form.

1.2 **Operational features:**

(a) The boots are usually to be worn over steel-toed safety shoes in conjunction with air-permeable CW protective suits.

(b) The disposable boots should fit over normal boots or shoes.

(c) They should be easy and quick to put on and take off.

(d) They must be comfortable.

1.3 **Specifications:**

(a) The boots must be available in an adequate range of sizes.

(b) They must have a non-slip sole.

(c) They should be made of a lightweight and comfortable material.

(d) The working life of the disposable boots must be a minimum of four hours or they must last for a walking distance of at least one kilometre.

(e) The boots must provide protection against mustard liquid drops at 30ºC up to 5g/m² (drop size approximately 5µl) for up to six hours and, in relation to test purposes only, the penetrating dose must not exceed 5µg/cm².

(f) They must withstand immersion in a hypochlorite solution with 12% active chlorine at 30ºC for 30 minutes.

2. IMPERMEABLE CW PROTECTIVE CLOTHING

2.1 **Purpose:**

This clothing is to be worn in conjunction with the air-permeable CW protective suit when there is a need for protection against accidental splashes of CW agents or common industrial chemicals (e.g. acids, alkalis, and solvents).

2.2 **Operational features:**

(a) The protective clothing must be easy to put on and take off.

(b) It must minimise the physiological stress on the wearer conducting inspection activities.

2.3 **Specifications:**

(a) The protective clothing must be resistant to small quantities of liquid CW agents and common industrial chemicals.

(b) It must resist snags, tears, and punctures.

(c) It must be available in an adequate range of sizes.

(d) The clothing must be disposable.

3. AIR-PERMEABLE CW PROTECTIVE SUITS

3.1 **Purpose:**

The air-permeable CW protective suit provides body protection against CWs.

3.2 **Operational features:**

(a) The protective suit must be easy and quick to put on and take off.

(b) It must minimise physiological stress under all climatic conditions on the wearer conducting inspection activities. This may be accomplished by making up to three options available for the user, without compromising the specifications below.

(c) It must be sufficiently comfortable so that inspection activities are not hampered.

3.3 **Specifications:**

(a) The clothing must provide protection against saturated mustard vapour at 30°C for 50 minutes. Through experimental testing, the penetrated amount should not exceed 5μg/cm^2.

(b) It is essential that it provide protection against liquid mustard drops at 30°C up to 5g/m^2 (a drop size approximately 5μl) for up to six hours (12 hours desirable), and through experimental testing, the penetrating dose must not exceed 25 mg × min./m³.

(c) It must resist snags, tears, and punctures.

(d) It must be available in an adequate range of sizes.

4. CW PROTECTIVE MASKS

4.1 **Purpose:**

The mask should provide full facial protection, as well as respiratory protection against CWs in solid, gaseous, liquid, aerosol, or vapour form.

4.2 **Operational requirements:**

(a) The mask should provide effective, prolonged protection for the respiratory system, the eyes, and the face against exposure to toxic chemicals.

(b) It should come with different types of canisters that protect against chemical agents and industrial chemical hazards, and these canisters must be able to be easily changed.

(c) It should not irritate the skin.

(d) It should be able to be chemically decontaminated and sanitised without degradation of its overall performance so that it can be used again.

(e) It should be simple to maintain in the field.

(f) It should provide easy inhalation, a good range of vision, not suppress voice communication, allow for use of short-range radio communication if required, and provide sufficient head mobility.

(g) It should allow for optical inserts in order that vision can be corrected.

4.3 **Operational features:**

(a) The mask system can be either a facepiece mask or a hood system.

(b) The mask must, consistent with its purpose, minimise physiological stress on a wearer conducting inspection activities under all climatic conditions.

(c) It must be provided with filter canisters, which ensure that these canisters can be rapidly changed in the field and in a contaminated environment.

(d) It must allow for the placement of optical inserts for the correction of refraction, without compromising the protection afforded by the mask, and as far as possible, without impairing the optical performance of the original visor or lenses of the mask. In addition:

(i) the inserts must be capable of being fitted firmly to the respirator and must not come out while the respirator is being put on and taken off;

(ii) the device holding the inserts must not have protruding parts which could damage the eye; and

(iii) the inserts must be able to be removed from the respirator, if necessary.

(e) It must allow for voice communication and must also be able to be used during short-range radio communication.

(f) It must provide sufficient head mobility and the restriction to the vision must be minimal.

4.4 **Specifications:**

(a) The mask must fit canisters with standard threads, in accordance with the specifications in European Standard (EN) 148-1 or the equivalent.

(b) It must have a protection factor of 1,000 for 95% of facial types under dynamic conditions, achieved by design or sizing, with or without corrective lenses.

(c) It must be sufficiently comfortable not to hinder inspection activities.

(d) If speech is of an acceptable clarity at a given distance while the respirator is not being worn, then that speech should continue to be of acceptable clarity when the speaker is wearing the respirator and the distance is halved.

(e) The facepiece must be able to be cleaned by washing, rinsing, or airing and must be able to be disinfected for reuse, without contamination and without a decrease in the mask's protection effect.

(f) All exterior components of the facepiece must have a resistance to liquid mustard at 30°C for not less than six hours.

(g) If a head harness is used, it must be adjustable and replaceable.

(h) If a breathing tube is used, it must be flexible and of an adequate length to permit the free movement of the head; the mask must not close off through kinking or through ordinary chin or arm pressure. It must not unduly disturb the wearer.

(i) Visor or lenses:

(i) The visor or lenses must be made of glass or plastic with smooth, finished edges and corners, and must be free from visible and optical defects. The power of the lens must comply with American Standard Institute (ANSI) Z87.1 2003 or EN 166:2001[17] or the equivalent, and the haze must be no greater than five percent.

(ii) They must transmit not less than 90% of the incident visible light according to ANSI/American Society for Testing & Material (ASTM) 1003-61 or the equivalent.

(iii) Solid plate lenses shall not fracture or chip, and laminated glass lenses shall show no separation of glass from the plastic interlayer when a steel ball of 16mm in diameter is dropped from a height of 127cm above the centre of the lens.

(iv) The visor or lenses must not reduce the binocular field of view by more than 30%.

(v) The visor or lenses must not mist or ice up.

(j) In defining leakage, the suck-in coefficient of a facepiece with a canister simulator must be not more than 6×10^{-5}.

(k) The inhalation resistance of the mask (without the canister) must not exceed 40 Pa at a continuous flow rate of 30 litres per minute and 150 Pa at a flow rate of 85 litres per minute.

(l) The exhalation resistance of the mask must not exceed 75 Pa at a continuous flow rate of 30 litres per minute and 500 Pa at a flow rate of 250 litres per minute.

(m) The carbon dioxide concentration build-up within the nose cup should not be higher than two percent.

[17] All ANSI and EN standard were updated as of August 2009.

5. CANISTERS (CW)

5.1 Purpose:

The purpose of the CW canisters is to protect the wearer against CWs.

5.2 Operational features:

(a) The canister must, consistent with its purpose, minimise physiological stress on a wearer conducting inspection activities under all climatic conditions.

(b) It must be configured to provide for fast changeovers.

(c) It must be easily disposable without posing an environmental hazard.

5.3 Specifications:

(a) The charcoal in the canister must conform to internationally recognised standards.

(b) The average moisture content in the charcoal of a complete canister must not exceed two percent of its weight, and the moisture from any single canister must not exceed five percent of its weight.

(c) The airflow resistance of each assembled canister must be no greater than 167 Pa (17mm of water) and no greater than 200 Pa in case of a combined military/industrial canister (class A2B2E2K2/P3 according to EN 14387) at an airflow rate of 30l/min before and after rough handling according to the method described in EN 14387) or the equivalent.

(d) The particle penetration of each assembled canister must not exceed 0.003% both before and after rough handling when tested using aerosol particles (either liquid or solid) at a concentration of 100± 20μg/l with an average particle diameter of 0.3μm, and a flow rate of 30 l/min.

(e) The gas life of the filter element must be tested using the following procedure, or other equivalent methods (which may include measurement of the dynamic activity):

Gas	**Challenge Concentration g/m³**	**Rate of Air Flow (Sinusoidal Strokes/min×volume) l/min**	**Breakthrough Concentration Mg/m³**	**Breakthrough Time Min**
HCN	2	24 × 2	5	At least 50
Cyanogen Chloride	2	25 × 2	5	At least 50
Dimethyl methyl phosphonate	4	36 × 2.2	0.05	At least 50

The equilibration of the canister and the measurement are carried out at 23 ±1°C and at 80% relative humidity.

(f) After rough handling of a canister according to the procedure described in EN 14387) or the equivalent, the carbon dust that is released in a flow of air during subsequent periods of 15 minutes must not exceed 3mg, while the total amount of carbon dust must not exceed 30mg during a period of eight hours.

(g) The canister must have a shelf life of at least five years and must be supplied in a sealed vapour-proof overpack. To simulate ageing, canisters must be aged in a forced-air circulating oven for 72 hours at 50°C. After ageing, the canisters must be tested for the following:

(i) the particle penetration must continue to meet the stated requirements;

(ii) the dimethyl methyl phosphonate gas life of aged canisters must continue to meet the stated requirement; and

(iii) the cyanogen chloride gas life of aged canisters must meet at least half the gas life requirement for cyanogen chloride when tested as above.

(h) The canisters must be free of foreign matter and contaminants, such as grease, and must also be free of dents, burrs, tears, punctures, and scratches. The canister thread must show no discontinuity or structural damage, such as cracks, splits, tears, shearing, or cuts when viewed with a 20× magnification.

6. CANISTERS (INDUSTRIAL)

6.1 Purpose:

These canisters should protect inspectors from specific industrial chemicals in solid, gaseous, aerosol, or vapour form.

6.2 Operational features:

(a) This canister must, consistent with its purpose, minimise physiological stress on a wearer conducting inspection activities under all climatic conditions.

(b) It must provide for effective and durable protection and be configured to provide a fast changeover.

(c) It must be easily disposable without posing an environmental hazard.

6.3 **Specifications:**

(a) The canister must provide protection against particulates and vapour (quality type A2B2E2K2 for vapour protection and P3 for particle protection, according to standard EN 14387) or the equivalent).

(b) If applicable, it must be provided with standard cartridge thread, according to standard EN 148-1 or the equivalent.

(c) It must have a minimum shelf-life of three years.

7. SAFETY GOGGLES

7.1 **Purpose:**

The safety goggles should provide eye protection from flying particles and chemical splashes.

7.2 **Operational requirements:**

(a) The goggles should be lightweight and made of a comfortable material.

(b) They should be able to be worn on their own or over glasses.

(c) They must provide a wide, undistorted field of vision.

(d) They must not fog.

7.3 **Specifications:**

(a) The goggles must conform to ANSI Z87.1-2003 or EN 166:2001 or the equivalent.

(b) The lenses must be made from a hard-coated polycarbonate of at least 1mm in thickness.

8. CW PROTECTIVE GLOVES WITH LINERS

8.1 **Purpose:**

The protective gloves should provide hand protection against CWs or industrial chemicals.

8.2 **Specifications (CW protection):**

(a) The gloves must be available in at least five distinctly different sizes.

(b) The outer gloves shall be made in a five-finger style of impermeable material, such as butyl rubber or the equivalent, which must be neither a dermal irritant nor an allergic sensitiser.

(c) The gloves must be provided with separate liners made of cotton or another fabric.

(d) Regardless of the hand size, the outer gloves must be at least 37cm long.

(e) The outer glove's original tensile strength must be at least 7585 kPa (1100 psi).

(f) The tensile stress at 200% elongation must be at least 520 kPa (75 psi) at 25ºC.

(g) The elongation must be at least 400%.

(h) The gloves must provide protection against liquid mustard drops at 30ºC up to 5g/m^2 (drop size approximately 5µl) for at least six hours. In relation to test purposes only, the penetrated amount should not exceed 5µg/cm^2.

(i) The gloves should be designed to reduce slipperiness when covered with a decontamination solution or water.

8.3 **Specifications (industrial-chemicals protection):**

The gloves must comply with EN 374 or ASTM F739 or the equivalent.

9. LEATHER WORK GLOVES

9.1 **Purpose:**

The leather work gloves should provide a good grip and physically protect the hands.

9.2 **Specifications:**

(a) These gloves must be made of special tanned heat-resistant leather or another material equivalent for the purpose.

(b) They must have padded knuckles, upper fingers, and back.

(c) They must be available in an adequate range of sizes.

10. INDUSTRIAL SAFETY HELMET WITH HEARING PROTECTION

Industrial safety helmet:

10.1 **Purpose:**

The purpose of the industrial helmet is to protect the head from any impact.

10.2 **Operational features:**

The helmet must be compatible with welding visors, face shields, respirators, and must protect the hearing.

10.3 **Specifications:**

(a) It must be a one-piece moulded shell with a beaded edge to provide rigidity.

(b) There must be no metal parts in cap or in accessories for slotted caps.

(c) The weight of the helmet must not exceed 300g.

(d) It should have an easily adjustable headband to fit all head sizes.

(e) It must conform to ANSI Z89.1-1986 or EN397[18] or the equivalent.

(f) The expiry date must be indicated on the helmet.

Hearing protection:

10.4 **Purpose:**

The helmet should attenuate noise to acceptable levels.

10.5 **Operational features:**

The helmet must be compatible with respirators and industrial safety helmets.

10.6 **Specifications:**

(a) The helmet must conform to ANSI S3.19-1974 or EN 352-5:2002[19] or the equivalent.

(b) It must be cleanable and disinfectable, or disposable.

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[18] This is the EN equivalent.
[19] This is the EN equivalent.

11. COTTON COVERALLS

11.1 **Purpose:**

The cotton coveralls act as a lightweight working garment for inspectors, and can be worn alone or under protective clothing.

11.2 **Operational features:**

(a) When worn alone, the coveralls must not allow the build-up of static electricity.

(b) They should be easy and quick to put on and take off.

11.3 **Specifications:**

The coveralls:

(a) should be easy to clean;

(b) be available in an adequate range of sizes;

(c) have fitted cuffs; and

(d) have no metal parts.

12. DISPOSABLE COVERALLS

12.1 **Purpose:**

The disposable coveralls should provide one-time protection against minor chemical splashes.

12.2 **Operational features:**

They should be easy and quick to put on and take off.

12.3 **Specifications:**

The disposable coveralls should:

(a) be lightweight and comfortable;

(b) resist snags, tears, and punctures;

(c) be resistant to alkali, acid, and common organic-solvent splashes; and

(d) be available in an adequate range of sizes.

13. UV PROTECTIVE SAFETY GLASSES

13.1 **Purpose:**

These safety glasses provide inspectors with eye protection from ultra-violet radiation and flying fragments.

13.2 **Operational requirements:**

The glasses must be:

(a) made of a lightweight and comfortable material;

(b) permit a wide and undistorted field of vision; and

(c) allow for correction of refraction.

13.3 **Specifications:**

(a) The safety glasses must filter UV radiation in the UVB spectrum at a minimum of 95%, in accordance with ISO 4851:1979.

(b) The glasses must provide protection for the eyes from every angle in the form of conventional spectacles with slide flaps.

(c) The lenses must be made from a hard-coated polycarbonate at least 1mm thick.

(d) The glasses must comply with ANSI Z87.1-1989 or the equivalent.

(e) The glasses must be available in an adequate range of sizes.

14. WATER BOTTLE

14.1 **Purpose:**

The water bottle provides a means of drinking and storage for potable water.

14.2 **Operational features:**

(a) The water bottle must be robust and supplied with a cloth cover and a belt or shoulder strap.

(b) It must be supplied with a drinking cup.

14.3 **Specifications:**

(a) The water bottle must be suitable for potable water.

(b) It must have a capacity to hold one litre.

15. WATER-FILTER KIT

15.1 **Purpose:**

The water-filter kit filters out suspended matter from water prior to chemical sterilisation to render it fit for drinking.

15.2 **Operational features:**

(a) The kit must be suitable for supplying filtered water to an inspection team.

(b) It must not require an electrical power supply.

15.3 **Specifications:**

(a) The minimum flow rate of the filter must be approximately 15 litres per hour.

(b) The filter must allow for the filtration of at least 200 litres before it needs replacement or cleaning.

(c) The filter must be capable of filtering out amoebic cysts.

(d) The filter should be treated to render it rot- and mould-proof.

16. EXPLOSION-PROOF FLASHLIGHT

16.1 **Purpose:**

To provide illumination in places where explosive mixtures of gases or vapours may exist.

16.2 **Operational features:**

(a) Each flashlight is for individual use.

(b) It must be battery operated. Batteries need not be rechargeable.

16.3 **Specifications**

(a) The flashlight must be manufactured with high-impact plastic or rubber with incorporated spare bulbs.

(b) It must have a three-way switch with light flashing capability.

(c) It must be intrinsically safe or have a key-lock system to ensure that the internal electrical circuit is broken before the flashlight can be opened.

(d) It must be suitable for operation in class IIC explosion group areas, in accordance with IEC 79 series standards or the equivalent.

(e) The surface operating temperature of the apparatus must not exceed 85ºC.

(f) It must have a light intensity of 1000 lux at three metres using a standard bulb with a fully charged battery.

(g) It must be capable of continuous operation for two hours.

(h) It must not weigh more than 500g, including the batteries.

(i) It must be waterproof and dustproof to the level of IP 65 in accordance with EN 60529:1991[20] or the equivalent.

17. SELF-CONTAINED BREATHING APPARATUS (SCBA)

17.1 Purpose

The purpose of SCBA equipment is to provide respiratory protection for an adequate period of time for the inspector in areas containing extreme chemical hazards or environments with an oxygen deficiency. It must be compatible with the impermeable (gas-tight) protective suits and with the closed respiratory system. The equipment must have minimal weight and must provide sufficient mobility and visibility.

17.2 Operational features:

(a) The apparatus must, consistent with its purpose, minimise physiological stress on a wearer conducting inspection activities under all climatic conditions.

(b) It must be sufficiently comfortable not to hinder inspection activities.

(c) It must provide for voice communication and must also be able to be used during short-range radio communication.

(d) It must provide sufficient head mobility and minimise any restriction of vision.

(e) It must be accompanied by a compressor unit that can fill the tanks on site, given that there is a restriction on their transport (breathing cylinders cannot be transported by air). The compressor unit and the filling process must comply with the ISP's regulations.

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[20] EN 60529:1991

17.3 **Specifications:**

(a) The facepiece must comply with EN 136 or the equivalent, and must be equipped with a single visor.

(b) Open-circuit systems must comply with EN 137 or the equivalent. Closed-circuit systems must comply with EN 145 or the equivalent.

(c) The minimum autonomous operating time for either system must be one hour.

18. PROTECTIVE MASK (INDUSTRIAL)

18.1 **Purpose:**

The protective mask (industrial) is to provide respiratory protection from hazardous substances in solid, gaseous, liquid, aerosol, or vapour form.

18.2 **Operational features:**

(a) The mask must meet the operational requirements found in paragraph 4.2 above.

(b) It must, consistent with its purpose, minimise physiological stress on a wearer conducting inspection activities under all climatic conditions.

(c) If applicable, the mask must provide for optical inserts to correct refractions, and without compromising the protection afforded by the mask and, as far as possible, without impairing the optical performance of the original visor or lenses of the mask. In addition:

(i) the inserts must be capable of being fitted firmly to the respirator and must not come out while the respirator is being put on and taken off;

(ii) the device holding the inserts must not have protruding parts which could damage the eye; and

(iii) the inserts must be able to be removed from the respirator, if necessary.

(d) The mask must provide sufficient head mobility and minimise any restriction of vision.

(e) It must come with different types of canisters that protect against specific chemical hazards.

18.3 **Specifications:**

The mask must conform to EN 136 or the equivalent.

19. EQUIPMENT BAGS WITH HEAT SEALERS

19.1 **Purpose:**

The equipment bags temporarily isolate equipment contaminated or suspected to be contaminated with chemical weapons material in solid, liquid, or aerosol form.

19.2 **Operational features:**

The equipment bags:

(a) must be capable of being sealed;

(b) must be supplied with an adequate number of portable sealing tools, if necessary;

(c) must be easy to seal by persons wearing protective equipment;

(d) must be resistant to chemical weapons; and

(e) must resist snags, tears, and punctures.

19.3 **Specifications:**

(a) The bag, including the seals and creases, must prevent penetration from the inside to the outside against mustard liquid drops at 30ºC up to 5 g/m² (a drop size of approximately 5µl) for up to 12 hours and, in relation to test purposes only, the penetrating dose must not exceed 5 µg/cm².

(b) The bags must be available in an adequate range of sizes up to 250 litres.

20. MASK-FIT TEST KIT

20.1 **Purpose:**

The purpose of this kit is to test the proper function and fitting of the individual mask/respirator, both military and industrial, before and during an inspection. It must be easy to set up and operate, must provide for the unambiguous determination of a proper fit and function, and must be field transportable. The test chemical simulant should not be harmful under the conditions of use, must not interfere with analytical equipment, and must not be a scheduled chemical.

20.2 **Operational features:**

The mask-fit test kit:

(a) must be based on an objective measuring principle;

(b) must be portable and usable in the field; and

(c) must not necessitate the inspectors bringing scheduled chemicals onto the inspected site.

20.3 **Specifications:**

The kit must be capable of detecting a fit factor of at least 1,000.

21. COOLING VEST

21.1 **Purpose:**

The purpose of the cooling vest is to minimise heat stress to inspectors wearing protective clothing in high temperature environments. The vest must have minimal weight, must not impede mobility, and must provide adequate functions for sustained operations.

21.2 **Specifications:**

(a) The vest should shape to conform to the body, should stay in place, and should permit comfortable bending and lifting.

(b) It should be designed to provide cooling for at least two hours.

(c) It should be of a minimal weight not heavier than is needed for it to provide the necessary cooling.

22. IMPERMEABLE (GAS-TIGHT) PROTECTIVE SUITS

22.1 **Purpose:**

The impermeable (gas-tight) protective suits should provide sustained body protection against chemical agents in bulk liquid or solid form, and against vapour in high or unknown concentrations. They should allow the performance of inspection activities and should thus provide maximum mobility and minimal physiological stress for the inspector.

22.2 **Operational features:**

The suits:

(a) must, consistent with their purpose, minimise physiological stress while an inspector is conducting inspection activities; and

(b) must be comfortable to wear.

22.3 **Specifications:**

The suits:

(a) must provide at least five hours' resistance time to droplets of mustard;

(b) must resist snags, tears, and punctures;

(c) must be supplied as a set of suit, boots, and gloves to comprise an impermeable system;

(d) must be capable of being worn over a self-contained breathing apparatus or must be equipped to accommodate an air-supply system;

(e) must be supplied with a system-integrity check kit; and

(f) must be provided with filtered ambient air cooling.

23. IMPERMEABLE (GAS-TIGHT) SUITS FOR TRAINING

23.1 **Purpose:**

These training suits are to be used for simulating impermeable suits during inspector training.

23.2 **Specifications:**

These suits should have the same features as the impermeable suits, but with a lower resistance to chemicals.

24. COLD-WEATHER GEAR

24.1 **Purpose:**

The cold-weather gear should enable inspectors to work in a low-temperature environment.

24.2 **Specifications:**

The cold-weather gear:

(a) should be lightweight, wind resistant, and rain resistant;

(b) be suitable for use in temperatures down to -40ºC; and

(c) include a hat, jacket, gloves, trousers, boots, and thermal underwear.

25. DECONTAMINATION KIT

25.1 **Purpose:**

The kit is to be used for the emergency decontamination of skin and personal equipment contaminated with chemical weapons material in solid, liquid, or aerosol form.

25.2 **Operational features:**

The decontamination kit:

(a) should be for individual use;

(b) must be easy to use and carry while protective equipment is being worn; and

(c) must provide for absorption and/or chemical inactivation of chemical weapons.

25.3 **Specifications:**

(a) The kit must contain sufficient components to decontaminate at least all the compounds listed in Schedule 1 of the Convention's Annex on Chemicals.

(b) It must allow for the decontamination of a surface area of one square metre.

(c) It must have a shelf-life of at least five years.

26. SAFETY LANTERN

26.1 **Purpose:**

The purpose of the safety lantern is to provide illumination to support inspection-team activities in places where explosive mixtures of gases or vapours may occur.

26.2 **Operational features:**

The lantern:

(a) must be easy to handle;

(b) must be supplied with a protective case for transportation; and

(c) must be battery operated.

26.3 **Specifications:**

(a) The lantern must be manufactured in high-impact plastic or rubber, and incorporate spare bulbs.

(b) It must have a handle enabling it to be carried.

(c) It must be intrinsically safe or have a key-lock system to ensure that the internal electrical circuit is broken before the lantern can be opened.

(d) Must be suitable for operation in class II C explosion group areas in accordance with IEC 79 series standards or equivalent.

(e) The surface operating temperature of the apparatus must not exceed 100ºC.

(f) It must have a light intensity of 2000 lux at three metres using a standard bulb with a fully charged battery.

(g) It must be capable of continuous operation for two hours.

(h) The weight should not exceed 5kg, including batteries and the carrying case.

(i) It must be waterproof and dustproof to the level of IP 65 in accordance with EN 60529:1991 or the equivalent.

27. SAFETY SHOES

27.1 **Purpose:**

The shoes should provide physical protection to an inspector's feet during inspections.

27.2 **Operational features:**

The shoes should:

(a) provide protection against sharp objects such as nails; and

(b) provide protection against falling objects so that there are no foot injuries.

27.3 **Specifications:**

The shoes:

(a) must comply with standard ANSI Z41-1991 or EN 3345 S3 or the equivalent; and

(b) must be available in an adequate range of sizes.

28. FLAMMABILITY/EXPLOSIVE/AIR-QUALITY MONITOR

28.1 Purpose

This air-quality monitor should ensure that confined spaces with potentially flammable/explosive atmospheres or insufficient air quality can be entered into and exited safely.

28.2 Operational features:

(a) The monitor must be battery-operated and should be easy to carry and use.

(b) The information displayed should be easily readable under all circumstances.

(c) The monitor must indicate the presence of combustible atmospheres, and provide an alarm whenever the level of explosive risk exceeds acceptable limits.

(d) It must provide for an alarm before reaching hazardous levels with regard to oxygen, carbon monoxide, and hydrogen sulfide.

(e) It must either not have a capability for retaining samples or must have the capability of being cleaned.

(f) It must have the capability to detect selectively only those chemicals mentioned under subparagraph 28.2(d) above.

28.3 Specifications:

(a) This air-quality monitor must have a scale range for combustible atmospheres: 0-100% of the lower explosive limit.

(b) It must be able to function continuously for at least two hours.

(c) It must provide an indication when the unit has been fully recharged.

(d) It must provide an indication that the battery is to be replaced or recharged within a certain period of time.

(e) It must be suitable for operation in class II C explosion group areas in accordance with IEC 79 series standards or the equivalent.

(f) No surface of the monitor coming in contact with the external environment shall exceed a temperature of 85ºC.

(g) For respiratory safety, the alarms, both audible and visible, must be triggered at the following levels:

(i) oxygen: 19.5% and below; and

(ii) carbon monoxide and hydrogen sulfide levels must be adjustable to accommodate possible differing threshold limit values of States Parties.

29. CW PROTECTIVE BOOTS (REUSABLE)

29.1 **Purpose:**

The purpose of the CW protective boots is to provide foot protection against chemical weapons material in solid, liquid, aerosol, or vapour form.

29.2 **Operational features:**

The protective boots:

(a) are usually to be worn with air-permeable CW protective suits;

(b) should be easy to put on and take off; and

(c) must be comfortable to use.

29.3 **Specifications:**

(a) The boots must be available in an adequate number of sizes.

(b) They must have a non-slip sole.

(c) They must have knee-length uppers.

(d) The integrity of the boots must be maintained after the wearer has worn them for 50km on stony terrain.

(e) The boots must provide protection against liquid mustard drops at 30ºC up to 5g/m² (a drop size approximately 5µl) for up to six hours and, in relation to test purposes only, the penetrating dose must not exceed 5µg/cm².

(f) They must withstand immersion in a hypochlorite solution with 12% active chlorine at 30ºC for 30 minutes.

(g) It is desirable that the boots provide physical protection in the form of steel toecaps and a stainless steel mid-sole.

(h) The boots must be capable of sustaining a minimum of two treatments specified in subparagraph 29.3(f) above (immersion in a hypochlorite solution) and must subsequently remain safe for use.

30. TEAM DECONTAMINATION KIT

30.1 **Purpose:**

The team decontamination kit is to be used for field decontamination of the inspection team and decontamination of their equipment which has been contaminated or is suspected of being contaminated with chemical weapons material in solid, liquid, or aerosol form.

30.2 **Operational requirements:**

(a) The kit must be able to provide decontamination under field conditions independent of the on-site infrastructure.

(b) It should be able to be assembled in a modular way to allow for flexibility with different combinations of equipment.

(c) It must be able to be safely transported by means of commercial passenger and cargo aircraft. For this kit there is no requirement for the return transport of used or contaminated materials.

(d) The kit must, at the minimum, be capable of decontaminating all items that have been exposed to Schedule 1 chemicals, especially those that have been used in chemical weapons, to the extent that treated items do not constitute an appreciable risk.

30.3 **Specifications:**

(a) The kit must at least comprise the following items:

(i) a one-person-portable spray unit weighing no more than 25kg;

(ii) a selection of brushes that can be used on various surfaces;

(iii) a supply of up to 10kg (in units of 1kg) of decontaminant, in the form of either powder or concentrate;

(iv) a supply of up to 10kg (in units of 1kg) of sorbent material, such as fuller's earth and activated charcoal;

(v) a selection of chemical-resistant containers for decontamination solutions;

(vi) a set of containers (preferably collapsible) sufficient to contain at least 60 litres of water;

(vii) two containers for transportation of organic solvents, each of which should hold at least 5 litres; and

(viii) no container should hold more than 20 litres.

(b) The kit must have a shelf life of at least five years.

31. DETECTOR KIT FOR CW AGENTS

31.1 **Purpose:**

The kit must be able to detect blister (H, HD, and L), nerve (G and V), and blood (AC and CK) agents. Other agent-detection capabilities are desirable.

31.2 **Physical features:**

(a) The detector kit must be compact and simple to use for field use and must have a rugged carrying case.

(b) The kit must have a shelf life of at least two years at 20ºC.

31.3 **Operational features:**

(a) The kit should enable the determination of the presence or absence of chemical agents to take place, either through colour changes or by the use of other method(s), as specified in the attached instructions.

(b) The kit must be capable of being operated by individuals wearing full chemical-protective gear.

(c) The kit must not contain any scheduled chemical.

(d) It must have the capability to perform a minimum of 10 tests per class of agent without the need for the kit to be re-stocked. The manufacturer shall provide a list of known substances which may cause interference.

31.4 **Specifications:**

(a) Sensitivity:

G and V:	as a minimum, 0.01 mg/m³;
H and HD:	as a minimum, 0.07 mg/m³;
L:	as a minimum, 0.7 mg/m³;
CK:	as a minimum 1 mg/m³; and
AC:	as a minimum 5 mg/m³.

(b) Response time: It is desirable that this should be no more than five minutes. The maximum response rate should be 15 minutes per class of agent at 20°C.

(c) There should be a low false-detection rate.

31.5 **Safety:**

The contents of the kit must be disposed of safely with due care being taken to minimise the impact on the environment of the disposal of the kit.

32. HAND-HELD CW DETECTORS/MONITORS (HHDs)

32.1 **Purpose:**

Hand-held detectors (HHD) are generally designed to monitor the safety of inspectors and shall be subject to the provisions of the health-and-safety policy.

32.2 **Operational features:**

If HHDs are used for verification purposes, they must comply with the characteristics and limitations for approved inspection equipment relevant to the purpose of the inspection. As verification equipment, HHDs must:

(a) be able to detect broad categories of chemicals relevant to the purpose of the inspection with a minimum number of false indications;

(b) have a dose-related short response time;

(c) have a short set-up time;

(d) be operable by inspectors in full chemical protective gear;

(e) be easily decontaminated;

(f) be either hand-held or shoulder-slung to allow the operator to perform functions other than transport;

(g) be battery operable for the duration of the inspection;

(h) meet the safety requirements for the area of operation;

(i) be operable independently of inspection-site support for the duration of the inspection;

(j) not allow data storage;

(k) be ruggedised for transportation and for field operations;

(l) be secure against possible tampering; and

(m) be operable over the range of temperatures expected during all inspections.

32.3 **Specifications:**

Physical features:

(a) The HHD must have a mass of less than 5kg, including the carrying case, and have sufficient supplies for 16 hours of continuous operation. It would be desirable that it is considerably lighter than 5kg. When designed to be carried on a shoulder strap, it may have a mass of up to 10kg.

(b) The maximum length including overpack must be less than 1.2 metres in any dimension.

(c) The HHD must have a volume of less than 5 litres, with no single dimension exceeding 0.5 metres. The instrument carried on a shoulder strap must have a volume of less than 10 litres.

(d) The HHD must be powered by battery or external power link (AC or DC). The battery must last for more than eight hours of continuous operation at 20°C. An overpack must be supplied with the transport appliances.

(e) The HHD must withstand storage temperatures from -30°C to 65°C.

Operational features:

(a) The HHD must be capable of being set up by one person and of warming up within less than 30 minutes at an ambient temperature of 20°C.

(b) The HHD must be capable of being calibrated with the use of simulants in the field.

(c) The HHD must be operable by one person after two hours of instruction. Easy-to-follow operating instructions must accompany the HHD. Detailed technical documentation must be supplied with the HHD.

(d) Changing any supplies must not cause an interruption of the operation of the HHD according to specifications of no more than five minutes at 20°C. The settings of the instrument must be retained during change.

(e) The HHD must be capable of running a continuous self-test indicating low battery or other malfunctions. If the battery is low, the HHD must trigger an audible and/or visible alarm clearly different from the alarm triggered at the detection of IDLH (immediate danger for life and health) levels of agents.

(f) The HHD must be one-hand-held or shoulder-slung.

(g) The HHD must be operable by an inspector in full protective gear.

(h) The HHD must be capable of being safely operated in a chemical environment with fused, bustered, and propellant-filled munitions and containers. Electromagnetic and ionising radiation must present no hazard. Flame-source gas must present no hazard. The HHD must be safe to use in an explosive environment.

(i) All parts of the instrument must permit easy decontamination. If decontamination is not possible, it must be possible for the contaminated parts, such as seals, alumina, silica, or tenax etc., to be easily removed and destroyed in accordance with safety and environmental protection requirements.

Detection:

(a) The HHD must be able to detect one or a combination of the following classes of compounds:

(i) organophosphorus compounds, including GA, GB, GD, and VX;

(ii) organosulfur compounds, including sulfur mustard, compounds containing sulfur and a halogen or nitrogen, and a halogen including nitrogen mustards; and

(iii) chemical-warfare related organic compounds containing arsenic, i.e. the lewisites (L1, L2, and L3).

(b) It is desirable that the HHD detect the largest possible combination of such classes of compounds without unduly compromising the false-positive detection rate.

(c) The HHD must have a near-zero false negative and minimum false-positive detection from dust and from vapours from other chemical compounds.

(d) The HHD must be specifically geared towards the detection of the classes of compounds enumerated above.

(e) The HHD must detect with the following sensitivities and response times (IDLH):

(i) G agents: 5 mg secs/m^3 in no more than 5 seconds;

(ii) V agents: 5 mg secs/m^3 in no more than 5 seconds;

(iii) H agents: 50 mg secs/m^3 in no more than 5 seconds; and

(iv) L agents: 50 mg secs/m^3 in no more than 5 seconds.

(f) The HHD should detect, with the following sensitivities and response times (time-weighted average (TWA)):

(i) G agents: 2.4mg secs/m³ in no more than 120 seconds;

(ii) V agents: 0.6mg secs/m³ in no more than 120 seconds;

(iii) H agents: 24mg secs/m³ in no more than 120 seconds; and

(iv) L agents: 24mg secs/m³ in no more than 120 seconds.

(g) If capable of detecting chemicals in liquid form, the HHD must detect the compounds in liquid form with the following desorption speed:

(i) G and V agents: 10 ug/cm^2 in 15 minutes; and

(ii) H agents: 80 ug/cm^2 in 15 minutes.

(h) The HHD must give an audible and/or visual alarm at the detection of a chemical agent at the IDLH level.

(i) The HHD must indicate chemical-agent concentrations relative to the IDLH level. The display must be clearly visible both day and night.

(j) Clear down time: the HHD must operate according to specifications after no more than 10 minutes (preferably no more than two minutes) operating at high concentrations at the maximum alarm level.

(k) The HHD must be able to operate according to specifications no more than 30 minutes after a heavy chemical overload of any kind.

32.4 **Data and software systems:**

(a) The HHD must have effective security features preventing tampering or, at the very least, tamper-indicating devices.

(b) The HHD must not allow any form of data storage except for safety reasons, where it may, for safety reasons, have an option to produce hard copies or be interfaced to a printer.

33. DETECTOR-TRAINING KIT FOR CW AGENTS

(a) The kit must contain simulant agents to facilitate training; therefore it must be compatible with the military detector kit.

(b) The manufacturer shall provide a list of known substances which may cause interference.

34. DETECTOR KIT FOR INDUSTRIAL CHEMICALS

34.1 **Purpose:**

The purpose of this detector kit is to test the environment for the presence of toxic gases or vapours.

34.2 **Physical features:**

The detector kit must include packs of tubes and a sampler for sampling.

34.3 **Operational features:**

Detection of the hazardous gases and vapours should be indicated by the length or shade of colour change of the detector tube after sampling of the gases or vapours.

34.4 **Specifications:**

(a) The sampler should have an automatic stroke counter, and should allow one-hand sampling with the option for a remote sampling adapter to be used.

(b) The shelf life of the tube should be as follows: 24 to 30 months or more at 20°C.

(c) The detector tubes must be self-indicated and printed with easy-to-read scales: concentration scale in either ppm, mg/m^3, or percent volume.

34.5 **Safety:**

The contents of the kit must be disposed of safely with a minimum impact on the environment.

35. TEST-PAPER PACKAGES FOR CW AGENTS AND OTHER TOXIC CHEMICALS

35.1 **Purpose:**

The test-paper packages must determine quickly and separately the presence of G, V, and H agents in liquid form. Other detection papers for the quick and separate identification of liquid or vapor from other CW agents or toxic chemicals are also desirable.

35.2 **Specifications:**

The military or industrial paper detectors/testers should be commercially available.

36. THERMOCHROMIC TAPE PACKAGES

36.1 **Purpose:**

The thermochromic tapes are necessary to record the temperature swings that inspection equipment is exposed to, which can be assessed by irreversible colour changes in the tape.

36.2 **Specifications:**

(a) The tapes must retain their irreversible colour change, irrespective of whether further temperature fluctuations take place, for a period of up to one year.

(b) The thermochromic tape packages should be usable in temperature ranges such as 40 to 60°C, 60 to 100°C, and 100 to 120°C.

(c) The tape packages should be self-adhesive; capable of attachment to a wider range of surfaces, and remain in place for periods up to one year.

37. WET-BULB GLOBE THERMOMETER

37.1 **Purpose:**

The wet-bulb globe thermometer measures whether work/rest schedules in hot environments are safe; it does this by measuring the wet-bulb, globe, and dry-bulb temperatures and by computing the wet-bulb globe temperature index.

37.2 **Operational features:**

(a) The meter must be small and robust. It must be supplied with a protective carrying case. It must have scaled down wet-bulb and dry-bulb probes and a scaled down globe thermometer on the upper surface of the unit.

(b) The unit must be battery operated.

(c) The unit must measure the unventilated wet-bulb, dry-bulb, and globe temperatures. It must apply a compensatory factor to allow adjustment for the scaled down size of the globe thermometer compared to standard size globe thermometer. These temperatures should be able to be read independently by switching to the desired temperature. The read-out should be digital and in degrees Celsius.

37.3 **Specifications:**

(a) This thermometer should calculate and display the outdoor and indoor wet-bulb globe temperature index, in accordance with ISO 7243, that is:

(i) $WBGT^{outdoors}$ = 0.7 × wet bulb temperature + 0.3 × globe temperature; and

(ii) $WBGT^{indoors}$ = 0.7 × wet bulb temperature + 0.2 × globe temperature + 0.1 × dry bulb temperature in degrees Celsius.

(b) The digital scale range should be 0 to 55°C.

(c) The digital scale increments should be 0.2°C.

(d) The battery life with single charge should allow for at least four hours of continuous use.

(e) An indication must be given when the unit has been fully recharged.

(f) The operating range is as follows: the unit must be capable of operating in external temperatures of 10 to 55°C.

38. COMPRESSOR FOR SCBA AIR CYLINDERS

38.1 **Purpose:**

The purpose of the compressor is to fill an SCBA cylinder on site.

38.2 **Physical features:**

(a) The compressor unit must be portable or must be able to be broken down into a small number of portable units.

(b) The unit must be self-sufficient, using electricity to supply breathable air to the SCBA cylinders.

(c) The unit must be compatible with OPCW equipment.

38.3 **Operational features:**

The compressor unit:

(a) must be operable by one person after training;

(b) must provide breathable air to the SCBA cylinders; and

(c) have a quality-control kit that provides a quantitative method for checking air quality, and a method for checking cylinder soundness.

38.4 **Specifications:**

The compressor unit:

(a) must be able to fill an SCBA cylinder in 30 minutes;

(b) should be mounted on a frame suitable for use in field situations;

(c) have an integrated breathing air-purification system;

(d) have working pressure-relief valves when in operation;

(e) must be operable over a wide range of supply voltages (100 to 240 VAC line, 50 to 60 Hz, or 12 to 24 VDC); and

(f) should weigh less than 45kg (including the transport container).

39. SUN HAT

Purpose:

The purpose of the sun hat is to provide protection from the sun.

39.1 **Operational features:**

The sun hat:

(a) must have a wide brim; and

(b) should preferably be made from water- and mildew-resistant materials.

39.2 **Operational features:**

The sun hat should be made from materials such as treated canvas, a polymer/cotton mix, or similar materials.

40. DUCT TAPE

40.1 **Purpose:**

The purpose of the duct tape is to seal gloves and boots to protective suits to provide extra protection against the ingress of CW agents or other hazardous chemicals.

40.2 **Specifications:**

The duct tape:

(a) should be approximately 5cm wide; and

(b) should be made of an ethylene-vinyl acetate impregnated material.

41. MINER'S LAMP

41.1 **Purpose:**

The miner's lamp provides head-worn illumination to be used in places where explosive mixtures of gases or vapors may exist and where the ability for inspectors to work hands-free is necessary.

41.2 **Operational features:**

The miner's lamp:

(a) should have a long-life battery, which may be rechargeable;

(b) should have a fitting so that it can be attached to a safety helmet or head band;

(c) must be operationally compatible with protective masks; and

(d) should illuminate an area broadly to enable inspection activities to be conducted in dim or dark light.

41.3 **Specifications:**

The miner's lamp:

(a) must be intrinsically safe (explosive-proof);

(b) must be suitable for operation in class IIC explosive group areas, in accordance with IEC 79 series standards or other equivalent international standards; and

(c) must have a light intensity of >100 lux at three metres.

Appendix 6

MEDICAL EQUIPMENT: OPERATIONAL REQUIREMENTS AND SPECIFICATIONS

1. CW CASUALTY-TREATMENT KITS

1.1 **Purpose:**

The CW casualty treatment kits provide emergency medical treatment in the event of CW casualties.

1.2 **Operational features:**

CW casualty treatment kits provide a means of emergency treatment of any OPCW casualties resulting from exposure to intoxicants.

1.3 **Specifications:**

(a) The kits are modular, and each contains the necessary medications and supplies for one of the listed CW agents (nerve, vesicant, incapacitant, or cyanide).

(b) The medications carried should reflect current OPCW medical treatment protocols and reflect the fact that consideration was given to such factors as safety, efficacy, availability, and logistical considerations, such as cost, shelf life, and temperature stability.

(c) Each module must contain treatment for one or two severe casualties, or two to four moderate/minor casualties.

(d) Each module must be suitable for incorporation into the emergency medical kit.

1.4 **Contents:**

The medications listed below are given only as an example to show the size needed for the modules, and should not be understood to represent either OPCW treatment protocols or the actual medications carried.

(a) **Nerve-agent module:**

1. Combined Obidoxime/Atropine autoinjector (12);
2. HI6 autoinjector (3);
3. Atropine pre-filled syringes (2);
4. Diazepam autoinjectors (2);
5. Atropine sulphate injection, multi-dose vials (2);

6. Homatropine sulphate eye drops, single-use container (5);
7. Salbutamol for nebuliser, vials (5);
8. Midazolam ampoules (2); and
9. Obidoxime for follow-up treatment, bottles (2).

(b) **Vesicant module:**

1. Salbutamol for nebuliser, vials (2);
2. Chloramphenicol eye ointment, tubes (4);
3. Homatropine sulphate eye drops, single-use container (5);
4. Silver sulphadiazine cream, tubes (2);
5. Eye patches (10); and
6. Oxybuprocaine eye drops, single-use container (5).

(c) **Cyanide module:**

1. Sodium thiosulphate, bottles (4);
2. Dicobalt edetate, ampoules (4); and
3. Glucose for injection, ampoules (4).

(d) **Incapacitant compartment:**

1. Physostigmine for injection, ampoules (5); and
2. 7 methoxy-tacrine, 5 ampoules.

2. EMERGENCY MEDICAL KIT

2.1 Purpose:

The purpose of the emergency medical kit is to provide emergency medical treatment to inspection team personnel.

2.2 Operational features:

The medical kit provides a means of treatment by OPCW medical staff for trauma, cardiac, and related emergencies.

2.3 Specifications:

(a) The kit consists of a soft, weather-resistant, but durable pack with pouches to contain medications and other necessary supplies. The kit may consist of a number of modules that may be carried in separate medical containers. These may be rigid protective cases, boxes, or durable packs.

(b) A cylinder (M6, 164 litres or equivalent) of medical-grade oxygen with an appropriate regulator must be included within the main body of the kit.

(c) The medications, equipment, dressings, and other items that are carried should reflect current OPCW medical-treatment protocols. Each item selected for

inclusion should reflect the fact that consideration was given to factors such as safety, efficacy, availability, cost, shelf life, and temperature stability.

(d) The quantity of each item carried should be sufficient for one or two severe casualties, or two to four moderate/minor casualties.

(e) Each kit, when full, should be able to be carried without difficulty by one person.

(f) The kit must allow for the packing of its contents without breakage.

2.4 **Contents:**

The medications, equipment, dressings and other items listed below are given only as an example to indicate the scope of treatment and size of the kit. It should not be understood to represent either OPCW treatment protocols or the actual medications, equipment, dressings, or other equipment that are carried.

(a) **Injectable medications (to be carried with a temperature logging probe):**

1. Adenosine
2. Adrenaline 1:10000 (0.01%) Min-I-Jet
3. Adrenaline 1:1000 (0.1%) Multi-dose
4. Adrenaline 1:1000 (0.1%) Epi-pen
5. Amiodarone
6. Atropine Min-I-Jet
7. Atropine sulphate multi-dose
8. Dextrose (50%)
9. Furosemide
10. Lignocaine (pre-filled syringe)
11. Lignocaine (1%)
12. Lignocaine 1% + Adrenaline 1/100,000
13. Metoclopramide HCL
14. Midazolam
15. Morphine sulphate
16. Naloxone HCL
17. Metoprolol
18. Cephazolin
19. Water for injection
20. Dextrose (5%)
21. Normal saline for injection (pre-filled)
22. Normal saline for injection

(b) **Oral or topical medications:**

1. Loperamide
2. ORS
3. Mg/Al/Ca anti-acid tabs, chewable
4. Salbutamol inhaler
5. Throat lozenges
6. Oxymetazoline
7. Livocabastine drops
8. Sunblock SPF 15+
9. DEET
10. Lip balm
11. Antihistamine stick
12. Chlorhexidine (20ml)
13. Alcohol swabs
14. Loratadine
15. Promethazine
16. Diazepam
17. Paracetamol
18. Codeine phosphate
19. Diclofenac potassium
20. Amoxycillin/Clavulanic acid
21. Norfloxacin

(c) **General equipment:**

1. Diagnostic set
2. Woods lamp
3. Thermometer and covers
4. Pulse-oximeter (finger)
5. Sphygmomanometer
6. Stethoscope
7. Tourniquet (trauma)
8. Mini-lancet
9. Glucose-monitoring kit
10. Space blanket
11. Textbook (on emergency treatment)
12. Sam splint
13. Stiffneck collar, multifit
14. Notebook and pen
15. Medical record sheets
16. Tourniquet
17. LED headlamp
18. Penlight torch (disposable)
19. Tongue depressors
20. Cold pack, chemically activated
21. Batteries

(d) **Surgical and related equipment:**

1. Disposable razor
2. Forceps – Adson (fine point, disposable)
3. Scissors (iris, disposable)
4. Scissors (all-purpose)
5. Scissors (trauma shears)
6. Scalpel (disposable #11)
7. Scalpel (disposable #15)
8. Needle holder (disposable)
9. Suture nylon 3/0 nylon
10. Suture nylon 4/0 nylon
11. Suture nylon 5/0 nylon
12. Sterile needle (21g)
13. Sterile needle (18g)
14. Sharps container
15. Sterile syringe, 10ml
16. Sterile syringe (5ml)
17. Sterile syringe (2ml), and needle (21g)
18. Giving set
19. IV catheter 16G
20. IV catheter 18G
21. IV catheter 20G
22. IV catheter cap
23. Intra-osseous access kit (drill etc)
24. Normal saline solution (1000ml)
25. Tourniquet
26. Pressure infuser
27. Blood-collection tube, plain
28. Blood-collection tube, heparinised

(e) **Airway equipment:**

1. Oxygen bottle and regulator
2. Oropharyngeal airway triple lumen (size 4)
3. Oropharyngeal airway triple lumen (size 5)
4. Oropharyngeal airway triple lumen (size 6)
5. BVM/ambubag + accessories (including swivel, non rebreather, etc.)
6. BVM mask (size medium)
7. BVM mask (size large)
8. Laryngeal mask (size 4)
9. Combitube 37F
10. ET tube (size 7)
11. ET tube (size 8)
12. Magill forceps
13. Laryngoscope set
14. ETT or LMA holder
15. End-tidal CO2 detector
16. Res-Q-Vac
17. Syringe (50ml)
18. Syringe (10ml)
19. Cricothyrotomy kit
20. Bougie (disposable)
21. Safety pneumothorax kit
22. Facemask (Hudson)
23. Facemask (non-rebreather)
24. Facemask (nebuliser)
25. Oxygen tubing
26. Chest tube
27. Heimlich chest drain

(f) **Dressings:**

1. Transparent, waterproof dressing
2. Transparent, waterproof with non-stick gauze
3. Micropore tape
4. Transpore tape
5. Waterproof tape, high-adhesion
6. Triangular bandage
7. Haemostatic bandage
8. Combine (large)
9. Protective sheet
10. Dressing packs
11. Crepe bandage, elastic (5cm)
12. Crepe bandage, elastic (10cm)
13. Eye patch
14. Emergency burn dressing
15. Gloves (non-sterile)
16. Gloves (sterile)

3. GENERAL FIRST-AID KIT

3.1 Purpose:

The general first-aid kit provides medical support to inspection team personnel and also supports the work of OPCW medical staff, in order that they can treat a range of minor illnesses and injuries. Such support will reduce the requirement to seek support from the ISP's medical staff or from local practitioners.

3.2 Specifications:

(a) The kit consists of a rigid box with multiple internal compartments to separate and contain medications and other necessary supplies.

(b) The medications, equipment, dressings, and other items carried should reflect current OPCW first-aid and general medical-treatment protocols. Each item should reflect the fact that consideration was given to such factors as safety, efficacy, availability, cost, shelf life, and temperature stability.

(c) The quantity of each item carried should be sufficient for approximately 200 person-days (five persons for six weeks, or 20 persons for 10 days).

(d) Each kit should reflect the contents of the personal first-aid kit and have limited ability to resupply the personal first aid kit.

(e) When full, the kit should be able to be carried without difficulty by one person.

(f) The kit must allow for the packing of its contents without breakage.

3.3 **Contents:**

The medications, equipment, dressings, and other items listed below are given only as an example to indicate the scope of treatment and size of the kit. It should not be understood to represent either OPCW treatment protocols or the actual medications, equipment, dressings, or other equipment that are carried.

(a) **Oral and topical medications:**

1. Loperamide
2. Omeprazole
3. ORS
4. Mg/Al/Ca anti-acid tablets, chewable
5. Salbutamol inhaler
6. Beclomethasone inhaler
7. Salbutamol for nebuliser
8. Throat lozenges
9. Oxymetazoline
10. Framycetin/Dexamethasone
11. Chloramphenicol ointment
12. Oxybuprocaine minims
13. Flouroscein minims
14. Livocabastine drops
15. Saline for irrigation
16. Sunblock SPF 15+
17. DEET
18. Lip balm
19. Antihistamine stick
20. Chlorhexidine (20ml)
21. Alcohol swabs
22. Alcohol gel handwash
23. Silver sulfadiazine cream
24. Acyclovir ointment
25. Betamethasone diproprionate
26. Ketoconazole
27. Povidone iodine ointment
28. RSDL
29. Loratadine
30. Promethazine
31. Diazepam
32. Temazepam
33. Metoclopramide
34. Paracetamol
35. Codeine phosphate
36. Diclofenac potassium
37. Lignocaine 1%, Adrenaline 1/100,000
38. Lignocaine 1%
39. Amoxycillin/Clavulanic acid
40. Norfloxacin
41. Metronidazole
42. Flucloxacillin
43. Cephalexin
44. Mebendazole
45. Aspirin
46. Diltiazem or nifedipine
47. Glyceryl trinitrate sublingual

(b) **Equipment:**

1. Woods lamp
2. Thermometer and covers
3. Ear plugs
4. Water-purification drops
5. Textbook (on general practice)
6. Medical record sheets
7. Travel medical booklet
8. First aid booklet
9. Penlight torch (disposable)
10. Batteries
11. Tongue depressors
12. Cold pack, chemically activated
13. Disposable razor
14. Forceps – Adson (fine point, disposable)
15. Scissors (iris, disposable)
16. Scissors (general purpose)
17. Scalpel (disposable #11)
18. Scalpel (disposable #15)
19. Needleholder (disposable)
20. Suture nylon 3/0 nylon
21. Suture nylon 4/0 nylon
22. Suture nylon 5/0 nylon
23. Sterile needle (21g)
24. Sterile needle (18g)
25. Sharps container
26. Sterile syringe (10ml)
27. Sterile syringe (5ml)
28. Sterile syringe (2ml) and needle (21g)
29. Intravenous giving set
30. Normal saline solution (1000ml)
31. Tourniquet
32. Blood-collection tube (plain)
33. Blood-collection tube (heparinised)

(c) **Dressings:**

1. Plaster strips
2. Plaster dressing
3. Stretch dressing
4. Transparent, waterproof dressing
5. Transparent, waterproof dressing with non-stick gauze
6. Non-stick dressing
7. Hydrocolloid dressing
8. Cotton-wool buds
9. Gauze
10. Micropore tape
11. Transpore tape
12. Waterproof high adhesion
13. Sport tape
14. Triangular bandage
15. Protective sheet
16. Dressing packs
17. Crepe bandage, elastic (5cm)
18. Crepe bandage, elastic (10cm)
19. Eye patch
20. Emergency burn dressing
21. Gloves (non-sterile)
22. Gloves (sterile)

4. FIRST-AID KITS (PERSONAL)

4.1 Purpose:

These kits provide a personal first aid kit for each inspector.

4.2 Operational features:

These kits provide inspectors with a means of administering minor first-aid treatment, without the need for support from medical personnel.

4.3 **Specifications:**

The personal first-aid kit should be in a compact, rugged, weather-resistant case.

4.4 **Contents:**

The medications, dressings and other items listed below are given only as an example to indicate the scope of treatment and size of the kit. It should not be understood to represent either OPCW treatment protocols or the actual medications, dressings or other equipment carried:

1. Norfloxacin
2. Loperamide
3. Omeprazole
4. ORS (oral rehydration solution)
5. Mg/Al/Ca anti-acid tabs (chewable)
6. Throat lozenges
7. Loratadine
8. Promethazine
9. Paracetamol
10. Oxymetazoline
11. Ear plugs
12. Sunblock SPF 15+
13. DEET
14. Lip balm
15. Antihistamine stick
16. Chlorhexidine 20ml
17. Alcohol swabs
18. Alcohol gel handwash
19. Plaster strips
20. Transparent, waterproof dressing
21. Travel medical booklet
22. First aid booklet
23. Water purification drops
24. Tweezers
25. Sterile syringe (2ml) and needle (21g)

5. PATIENT MONITOR

5.1 **Purpose:**

To monitor a casualty's vital signs in a situation where a medical attendant is carrying out a resuscitation alone.

5.2 **Operational features:**

(a) The unit must be capable of measuring the following parameters continuously:

(i) blood pressure (systolic and diastolic);

(ii) pulse oximetry;

(iii) pulse rate;

(iv) skin temperature; and

(v) core (rectal) temperature.

(b) The unit must include a defibrillation capability.

(c) The unit must be capable of displaying an electrocardiographic trace on the same screen.

(d) The unit must provide a hard copy/printout of selected information.

5.3 **Specifications:**

(a) The unit must be small, easily portable, and sufficiently rugged for field use.

(b) The parameters are to be displayed numerically on a single screen.

(c) The unit must be capable of showing the trend over time of the measured parameters.

(d) The temperature probes and electrodes shall be disposable.

(e) The unit must be battery operated with a rechargeable battery and must operate for at least 10 hours before requiring to be recharged.

(f) The unit must also be capable of operating with mains power.

6. INDIVIDUAL HEAT-STRESS MONITORS

Work in protective clothing leads to heat retention and potential heat illness. Individual monitoring provides an indication when a particular person is approaching dangerous levels of heat storage (as opposed to environmental climate monitoring, which is useful in regard to providing collective guidelines for heat-stress prevention).

6.1 **Purpose:**

The individual heat-stress monitor is to be used:

(a) to prevent individuals from developing heat stress during work in protective clothing;

(b) to allow for the monitoring of individual physiological parameters which could indicate directly or indirectly the potential heat stress of the patient;

(c) to provide information to wearers and medical staff on their physiological state during exposure to heat stress; and

(d) to evaluate the degree of heat stress that is present in the workplace.

6.2 **Operational requirements:**

(a) The heat-stress monitor should be able to be worn underneath protective clothing and monitor skin or core temperature, respiratory rate, heart rate, and motion (position).

(b) It should be able to provide an alarm based on individual settings or wirelessly provide real-time data to an observer who can monitor the parameters.

(c) If the monitor transmits data wirelessly, the method of transmission should be compatible with OPCW radios or related transmission equipment.

(d) The monitor should have a capacity to record findings for later retrieval and analysis.

(e) It should be lightweight, portable and sufficiently rugged for use in the field.

6.3 **Specifications:**

(a) The monitor should have a level of accuracy of at least ± 0.1º, and should operate in a temperature range of 32ºC to 40ºC.

(b) The instrument must have the capability of working continuously for over six hours on a battery charge.

(c) The instrument must have the capability of working up to a temperature of 60ºC and under an operating humidity of 0% to 95% (non-condensing).

6.4 **Specifications for the heart-rate monitor:**

The heart-rate monitor:

(a) must transmit information through the layers of the individual protective equipment (IPE) to an external receiver;

(b) should be of rugged construction, to enable it to be used in the field;

(c) must not interfere with an inspector's efficiency;

(d) should not be affected by perspiration or water;

(e) should weigh less than 100 grams (the complete unit); and

(f) should operate continuously for more than six hours.

7. PORTABLE ACETYLCHOLINESTERASE-ACTIVITY MONITORS

7.1 Activity levels of the enzyme acetylcholinesterase in the blood of a member of the inspection team can indicate exposure to the organophosphorus group of chemicals. Portable monitors will allow baseline and post-exposure readings to be taken during inspection activities.

7.2 **Purpose:**

The purpose of the portable acetylcholinesterase activity monitor is to assess individual acetylcholinesterase activity levels during an inspection or investigation of alleged use.

7.3 **Operational requirements:**

(a) The system should be portable, incorporated into medical kits, easy to transport and manage, and be operable by one person.

(b) The readings must be possible on blood samples less than 5ml.

(c) The system should allow for frequent, repeated field measurements.

7.4 **Specifications:**

(a) The accuracy of this monitor should be comparable to that of laboratory instruments (with an error rate not exceeding five percent).

(b) The monitor should provide a reading corrected for haemoglobin levels.

(c) The monitor should be capable of measuring both plasma and red cell acetylcholinesterase activity.

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